OKI

IBM-COMPATIBLE MICROLINE 182/183

Printer Handbook

SPECIAL NOTE

This manual will help you install and use your new OKI IBM-compatible MICROLINE 182 or 183 printer. It contains everything you need to know to print with your MICROLINE's special features. If you still need assistance after reading this book, please contact your dealer for fast, personal service. If your dealer cannot answer your questions, please ask us. Simply call OKIDATA GmbH (0211-5979401), and ask for Field Support.

Every effort has been made to ensure that the information in this document is complete, accurate, and up-to-date. OKI assumes no responsibility for the results of errors beyond its control. OKI also cannot guarantee that changes in software and equipment made by other manufacturers, and referred to in this book, will not affect the applicability of the information is this book.

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MICROLINE 182/183 IBM-COMPATIBLE PRINTER PRINTER HANDBOOK

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INTRODUCTION

You probably want to set up your new ML182/183 IBM-compatible printer quickly and to get your computer system working for you. This handbook is designed to help you achieve that as quickly as possible.

Chapter 1 describes unpacking, testing, and connecting your printer to your computer. Using the steps provided, you can be ready to operate your printer in a matter of minutes.

Chapter 2 outlines uses of the pushbuttons, lever, and lights, and explains various ways to load paper.

Chapter 3 explains how you can program your printer for special printing effects and how to use the control codes in a software package.

The appendixes provide more detailed information on connecting your computer and reference charts for quick review after you have read this handbook. A glossary at the back defines some computer terms.

If you have questions or problems after reading this handbook, call your dealer for fast, personal service. If your dealer cannot assist you, please call us:

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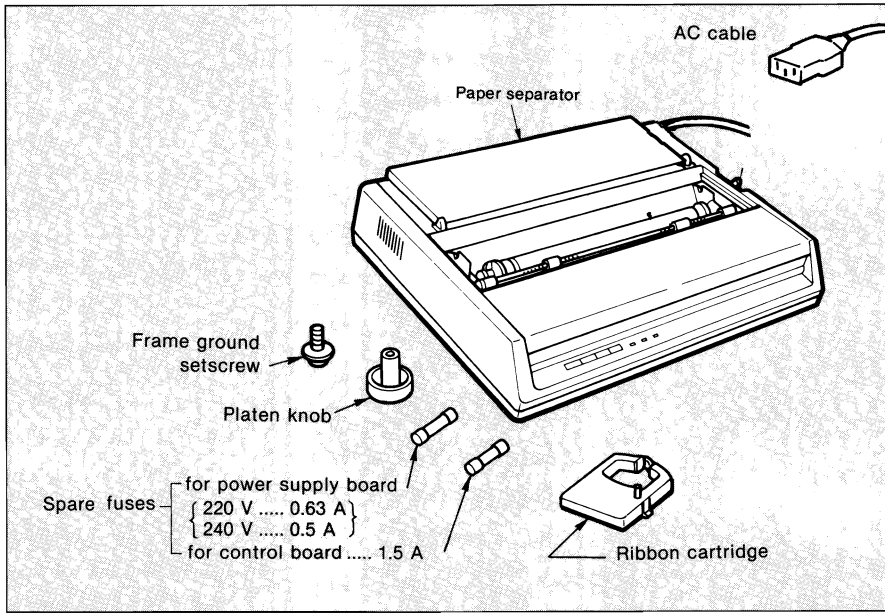
CHAPTER 1.
SETTING UP YOUR PRINTER

CHAPTER 1 SETTING UP YOUR PRINTER

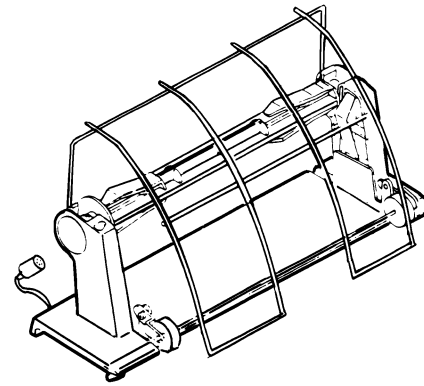
Your IBM-compatible ML182/183 printer is packed in a protective container along with some extra items you need. These items include:

(1) ML182

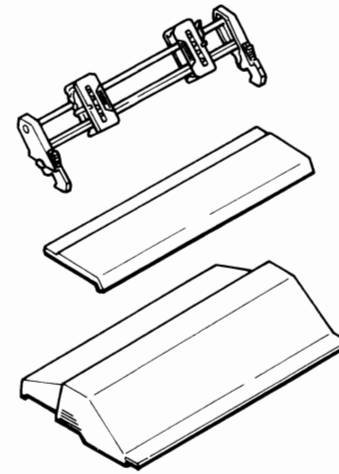


Optional equipment available for your IBM-compatible ML182 pritner includes:

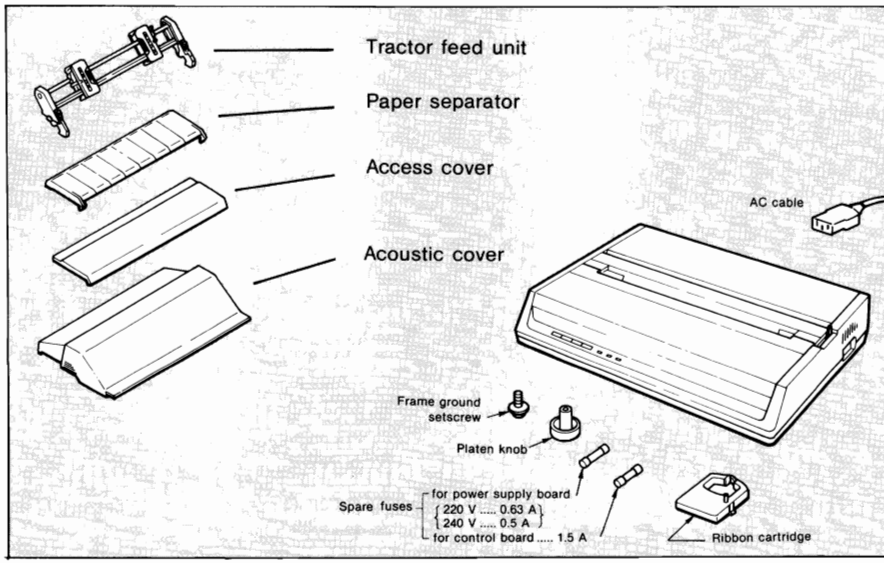
- Roll paper stand



- Tractor feed option kit
  - Tractor feed unit
  - Access cover
  - Acoustic cover



(2) ML183

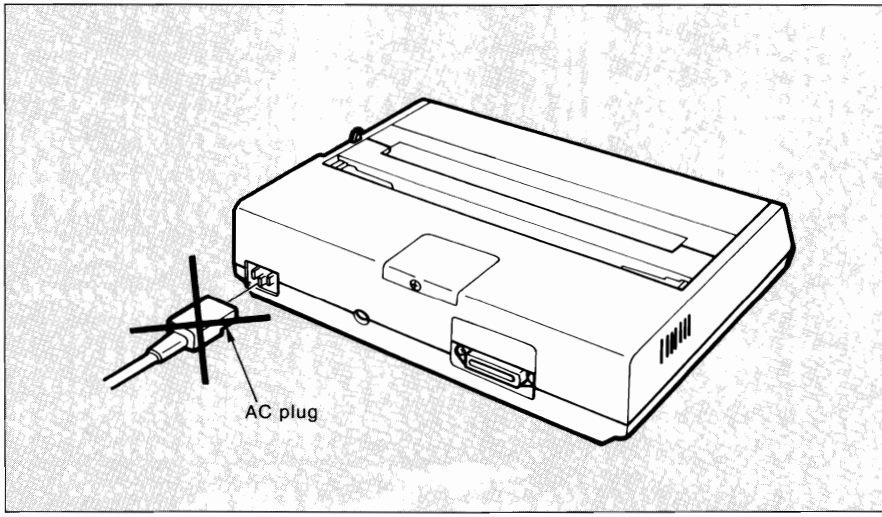


Optional equipment available for both the ML182 and ML183 include:

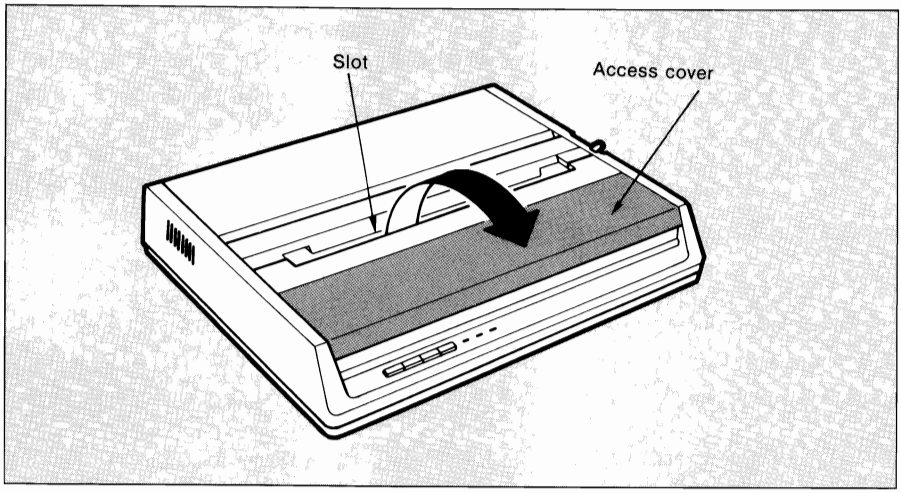
- Interface equipment
  - Super-Speed (19,200 baud) RS232C serial board
  - High-Speed (9,600 baud) RS232C serial board (ML182 only)
  - Super-Speed (19,200 baud) RS422 serial board
  - High-Speed (9,600 baud) RS422 serial board (ML182 only)
  - Current-loop serial board

Let's begin:

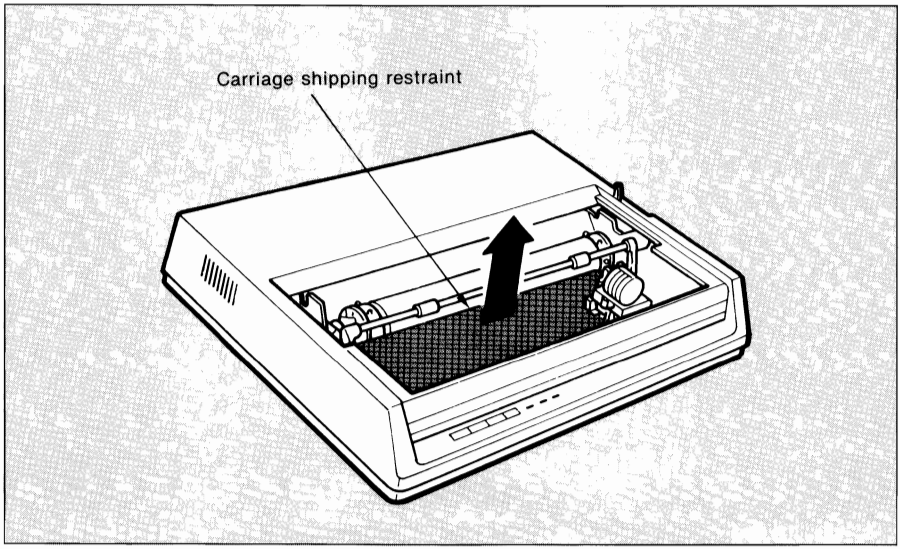
1. Do not plug in your printer yet. That step comes later.



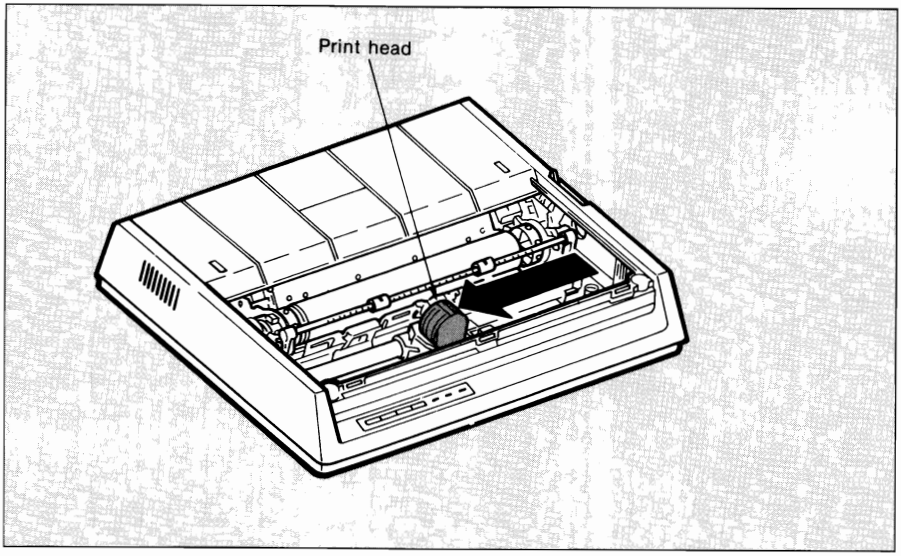
2. Remove the access cover by inserting your hand in the top cover slot (see figure) and lifting off the access cover.



3. Remove the carriage shipping restraint that keeps the print head in place.

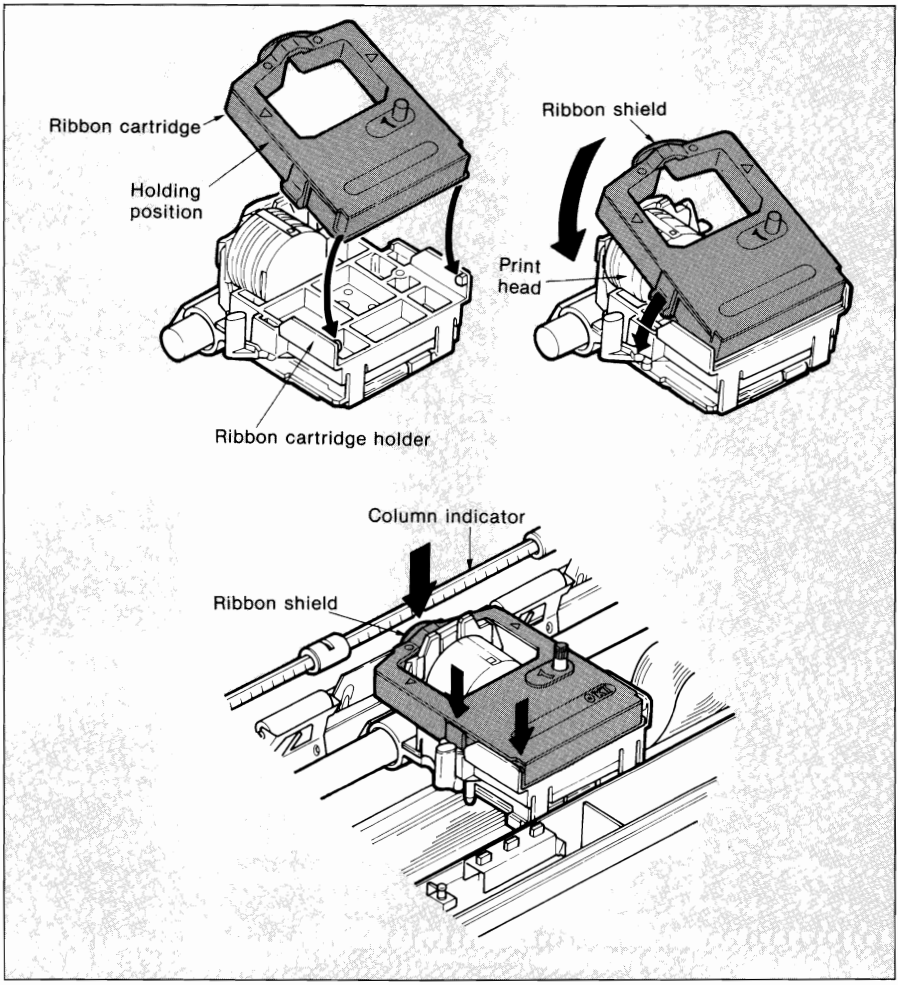


4. Gently slide the print head to the middle of the printer or to the left side so that it is away from the rollers on the column indicator bar.



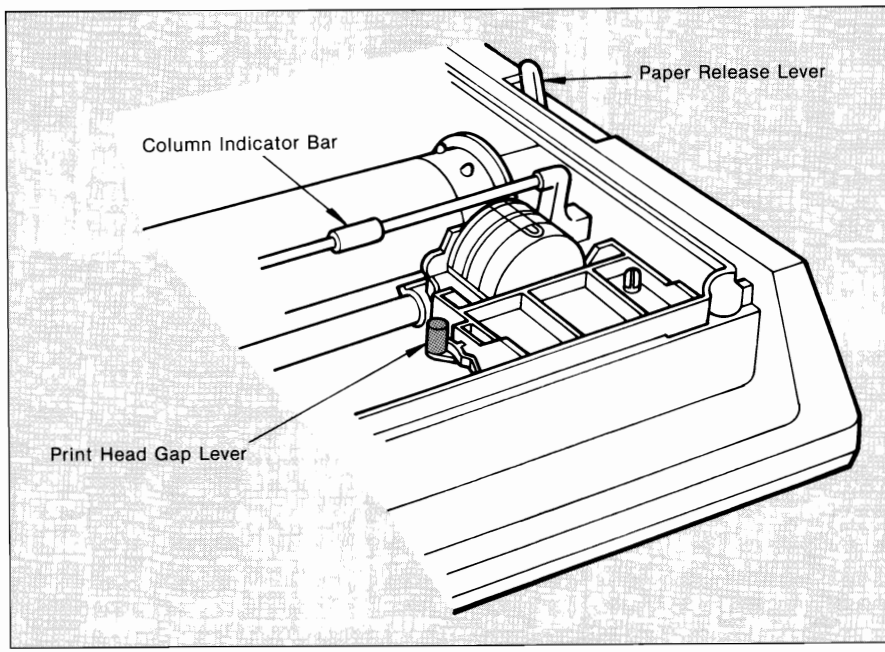
5. Place the black ribbon cartridge on the ribbon cartridge holder. The easiest method is to tilt the back of the cartridge so that it slides into the area of the plate that is nearest the front of the printer, then lower the top of the cartridge (where the plastic ribbon shield is located) over the print head. The tabs on both side of the cartridge should align perfectly with the inserts on the print head plate.

CAUTION: *Use only genuine OKI ribbon cartridges in your printer. Do not remove the ribbon shield.*

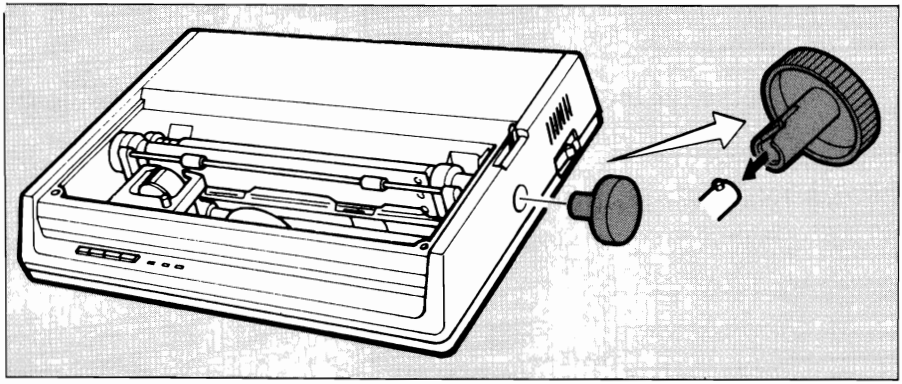


6. Press gently on the cartridge until you feel it snap into place. To remove the ribbon cartridge, make sure the print head is away from the rollers, then grasp the cartridge on both sides of the print head and lift up.

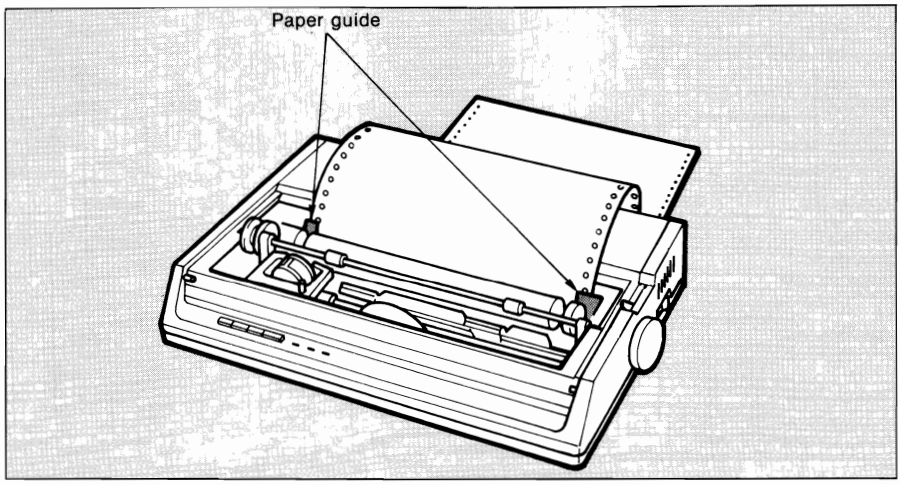
7. The blue lever located to the left of the ribbon cartridge is used to adjust the print head gap for single- or multi-part paper. When single-part paper or two-part paper is in the printer, slide the blue lever toward the print head. To print on three- or four-part paper, slide the lever away from the print head.



8. Put the platen knob shaft in the hole on the right side of the printer.



9. Try a quick self test to make sure your new printer is working properly. Insert a piece of computer paper (with sprocket holes) or a single sheet of typing paper into the printer as you would insert it in a typewriter. If you are unfamiliar with typewriters, here is the method:
   a. Open the paper release lever by sliding it toward you.
   b. Insert the paper as far as you can into the slots provided by the black paper guides.



c. Close the paper release lever.

d. Turn the platen knob away from you to pull the paper around the platen and behind the column indicator bar.

e. Move the column indicator bar back onto the platen so that the rollers rest on the paper you just inserted.

10. Advance the paper, using the platen knob, until 1 inch of paper appears above the column indicator bar.

11. Replace the access cover:
    a. Insert the three tabs in the edge of the access cover into the holes on the top front edge of the printer.
    b. Lower the access cover onto the printer.

12. Grasp the paper and pull it through the opening in the access cover. Use the platen knob if you need more paper.

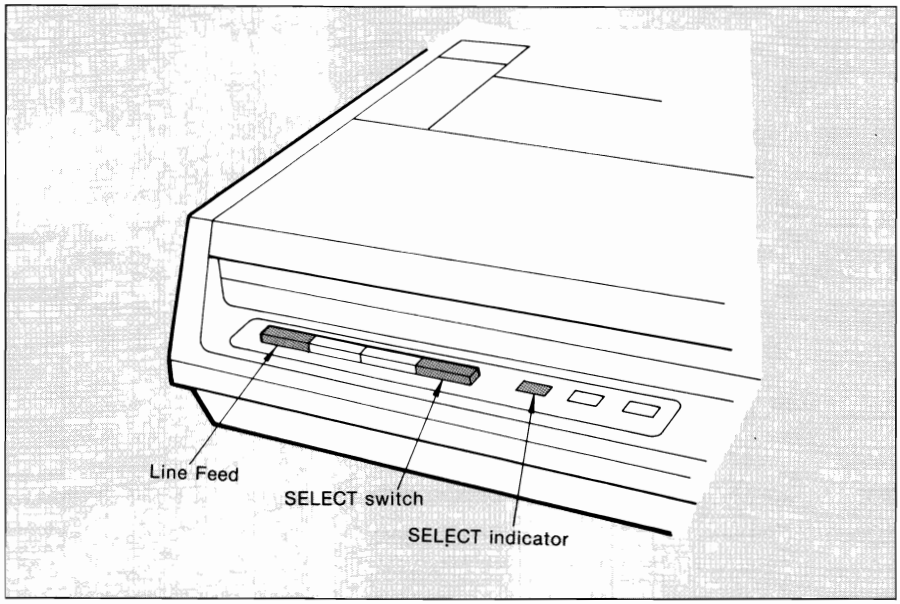
13. Insert the connector end of the power cord into the plug on the left side of the printer back.

14. Make absolutely certain that the ON/OFF power toggle switch on the side of the printer is OFF. (A sudden power surge can damage the printer.)

15. Plug the power cord into a grounded (three-pronged) electrical outlet.

CAUTION: *The printer must be grounded at all times. Do not avoid the grounding plug by using a three-to-two prong conversion plug.*

16. To print the self test, hold down the LF (line feed) switch (located on the front panel) and turn the power switch ON. When the printer turns on (indicator lights), release the LF switch.



17. The following test pattern will be printed, beginning with a printer revision number that is followed by a rolling character pattern.

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijk
BCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijkl
CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklm
DEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
EFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
FGHIJKLMNOPQRSTUVWXYZ[\]^ `abcdefghijklmnop
```

NOTE: *During self test printing, the SELECT indicator is out.*

18. To stop the test, press the SELECT switch (located on the front panel) or turn the power switch OFF.

After the printer has shown that it is in operating order, you are ready to connect your computer. First, you need an interface cable. If you don't have one, see your computer dealer or, if you have the equipment, make your own cable using the instructions in Appendix C.

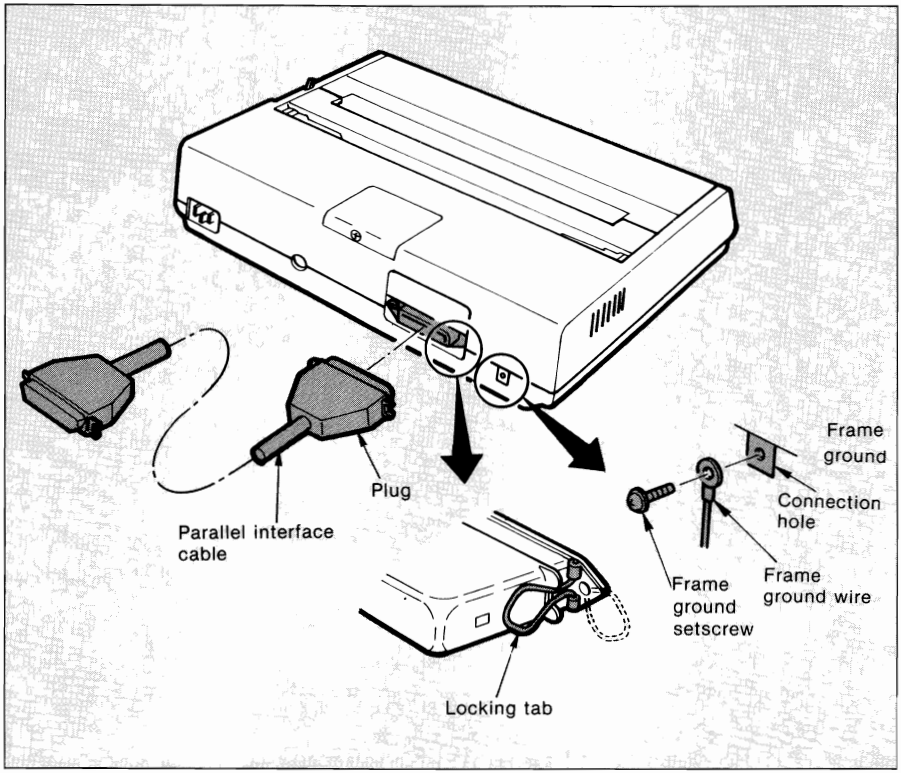
CONNECTING YOUR COMPUTER

You should have either a parallel or serial interface cable to connect your computer to your ML182 IBM-compatible printer. Before you connect the cable, make sure both printer and computer power is OFF.

Connecting a Parallel Interface

1. Insert the 36-pin plug in the appropriate receptacle toward the right side of the printer back.

   If no frame ground (FG) included in your interface cable, connect a frame ground wire from the computer to the frame ground connection hole at the back of the printer using the setscrew attached to the printer.



2. Snap the two wire clips onto the plug.

3. Insert the other end of the cable into your computer. You may also connect it to another peripheral device, such as a disk drive, if your equipment is designed for "daisy-chain" connection.

4. Turn on the equipment and try the one-line program shown below, using the proper print statement for your computer (the example uses LPRINT). (Make sure you have paper and ribbon in the printer.)

5. Type: LPRINT "Everything's okay" and then run the program.

6. Your printer should print "Everything's okay" at 10 characters per inch.

NOTE: *If the printer did not print, make sure you entered the program properly. Some computers require that you assign a number to the printer and specify that number in your print statement; for example OPEN # 3 means the printer is on line # 3 to the computer.*

7. Now try this program (change it, if necessary, to suit your computer's requirements):

```
10 LPRINT "EVERYTHING'S OKAY"
20 LPRINT "THIS LINE SHOULD BE SPACED 1/6"; CHR$(34);"
   UNDER THE FIRST"
```

8. The printout should look like this:

```
EVERYTHING'S OKAY
THIS LINE SHOULD BE SPACED 1/6" UNDER THE FIRST
```

If it is overprinted, make a small adjustment to the printer so that it automatically inserts a line feed at the end of a line, because your computer does not supply the line feed. (See page 18 for details.)

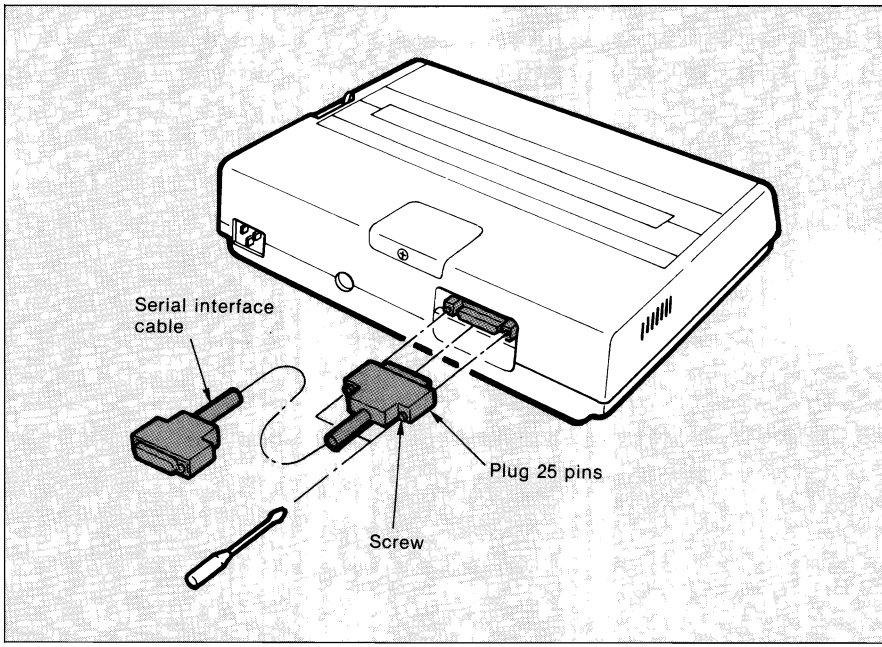
Serial Interfaces

The optional High-Speed RS232-C serial interface can run up to 9,600 baud using Printer Ready/Busy protocol. And the Super-Speed board has a maximum speed of 19,200 baud with a choice of either printer Ready/Busy or X-ON/X-OFF protocol.

Before connecting your interface cable, make sure both your printer and computer are off before inserting the cable. Important to note if you are using a serial cable, you are probably required to use an OPEN and PR#1 statement in BASIC programming instead of LPRINT. Consult your computer documentation for details.

Connecting a Serial Interface

1. Insert the 25-pin plug in the receptacle at the right on the printer back.
2. Tighten the mounting screw on each side of the connector shell so that it is securely attached to the printer.
3. Insert the other end of the cable in your computer. You may also be able to connect the cable to another peripheral device, such as a disk drive, if your equipment accommodates "daisy-chain" connection.



4. Make sure you have a ribbon cartridge and paper in the printer.
5. Turn ON the power and try this one-line program to make sure the connection is correct:

```
LPRINT "Everything's okay"
```

NOTE: *Your computer may require a different print statement, such as PRINT # 1 or PR # 1. Check your computer documentation for details.*

6. Run the program; your printer should print this at 10 characters per inch:

```
Everything's okay
```

7. Now try this program (modify it to suit your computer requirements):

```
10 LPRINT "Everything's okay"
20 LPRINT "This line should be spaced 1/6" under the first"
```

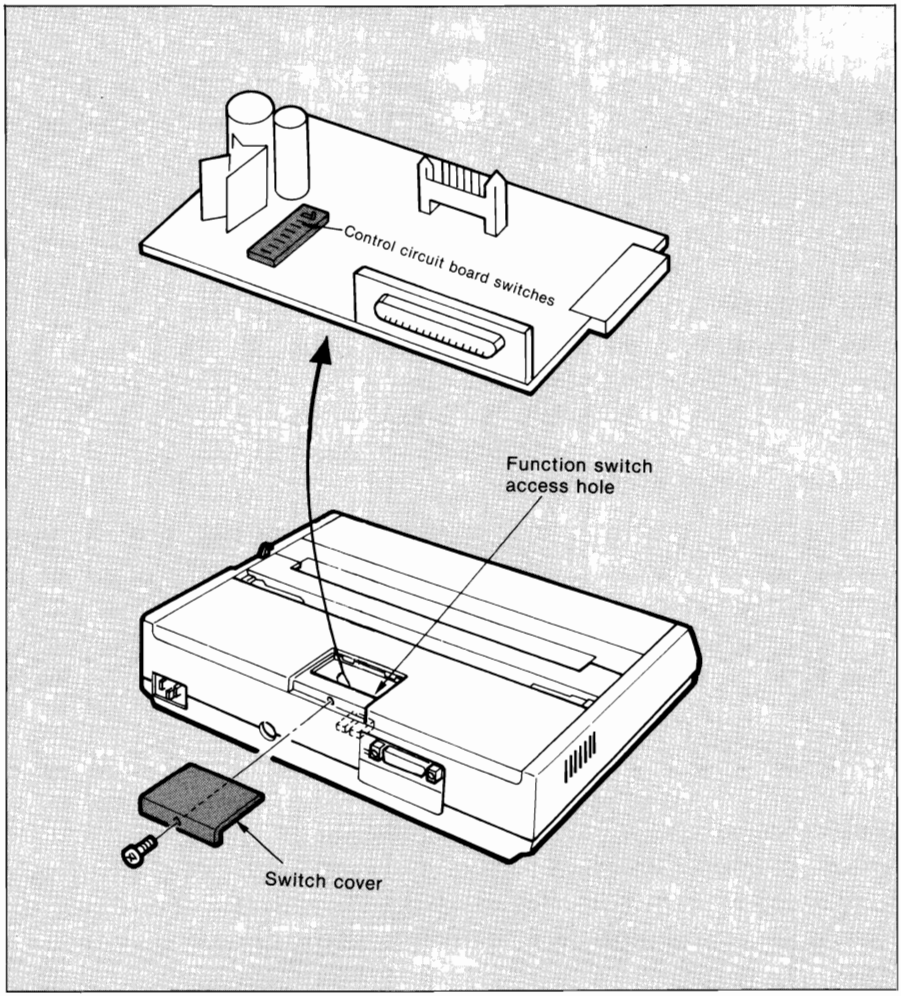
8. The printout should look like this:

```
Everything's okay
This line should be spaced 1/6" under the first
```

9. If it is overprinted, make a small adjustment in the printer so that it automatically inserts a line feed at the end of a line, because your computer does not supply the line feed. (See page 18 for details.)

SETTING THE INTERNAL SWITCHES

Underneath the small cover on the top of the printer are eight tiny switches that allow you to select a specific language and to make the printer meet the requirements of your computer. This section describes the switches and their factory settings. If you need to change the settings, follow the instructions below.



NOTE: *If you have the optional interface board installed, this switch bank is located on the lower board.*

Switch 1 selects either ø/Ø or ¢/¥ character set in the location of IBM character set (9B) H and (9D) H respectively, depending on the setting. Set to OFF, the printer will power up in the ø/Ø character set. And set to ON, the printer will power up in the ¢/¥ character set.

It is recommended that you set the printer to print the character set you will be using most often.

Switch 2 is set in the OFF position and establishes 10 CPI as the default character pitch; in the ON position, 17.1 CPI is established as the default character pitch.

Switch 3 controls the automatic line feed. It is set in the OFF position because the IBM Personal Computer automatically sends a carriage return to the printer at the end of each line. Set in the ON position, switch 3 provides automatic double spacing.

Switches 4 and 5 work together to select the length of the paper in the printer. The setting before shipment is as follows:

11 inches for 240-V version
12 inches for 220-V version

The paper length selections are:

Length of paper	Switch 4	Switch 5
11-⅔ inches	OFF	OFF
8.5 inches	OFF	ON
11 inches	ON	OFF
12 inches	ON	ON

Switch 6 is the automatic "skip over perforation" setting, which is factory set in the OFF position. When it is set in the ON position, the printer automatically advances paper from the last line of one page to the first line of the next page, skipping over the perforation between pages.

Switch 7 selects the character set. This switch is factory set in the ON position and establishes character set II as the default character set. In the OFF position, character set I is established as the default character set.

Switch 8 selects a programmed memory, which is an internal ROM in a CPU or an external ROM. The factory setting is for the external ROM.

The factory switch settings are:

(1) 220-V version

Switch	Selection	Setting
1	ϕ/Ø	OFF
2	10 CPI	OFF
3	NO AUTO LF	OFF
4	12 inches	ON
5		ON
6	NO SKIP OVER PERFORATION	OFF
7	CHAPACTER SET II	ON
8	128K ROM	OFF

(2) 240-V version

SWitch	Selection	Setting
1	ϕ/Ø	OFF
2	10 CPI	OFF
3	NO AUTO LF	OFF
4	11 inches	ON
5		OFF
6	NO SKIP OVER PERFORATION	OFF
7	CHARACTER SET II	ON
8	128K ROM	OFF

To reset the switches, proceed as follows:

1. Make sure the printer power is OFF and the power cable is unplugged.
2. Using a phillips-head screwdriver, loosen the screw on the switch cover at the back of the printer.
3. Use a sharp-tipped instrument, such as a ballpoint pen or toothpick, to slide the appropriate switch(es) to a new setting.
4. Replace the switch cover and tighten the screw.

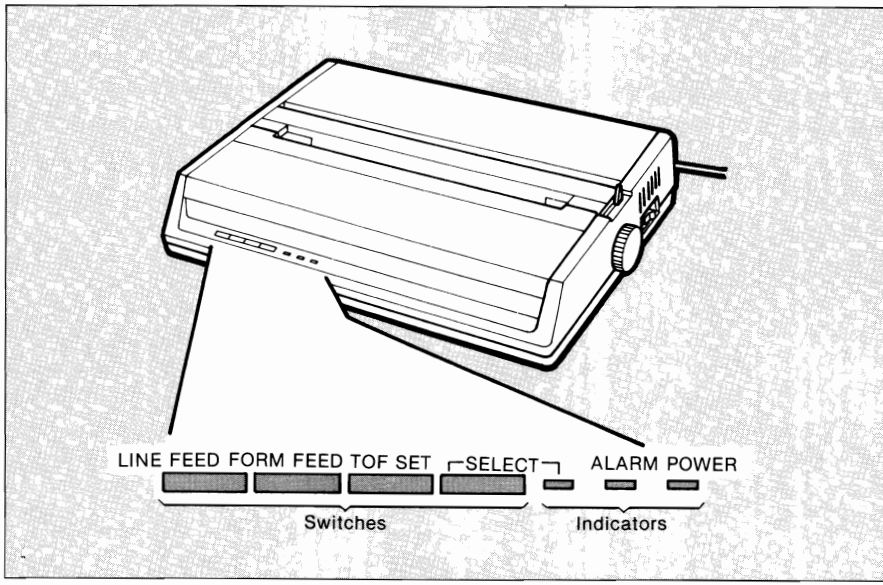
CHAPTER 2.
OPERATING YOUR PRINTER

CHAPTER 2 OPERATING YOUR PRINTER

SWITCHES, LEVER, AND INDICATORS

Before you use your printer, it may be helpful to summarize the switches, lever, and indicators on the printer and to consider the various methods of loading paper.

On the front panel of the printer, there are four switches, two of which were briefly introduced in the setup procedure. In addition, there are three indicator lights that show the status of the printer.



POWER Indicator: Indicates that the printer power is turned ON.

SELECT Switch: Pressing this switch after the printer power is ON places the printer in deselect mode, not communicating with the computer. To return to select mode, simply press this switch again. Pressing this switch also stops the self test.

SELECT Indicator: Works together with the SEL switch. Lights when the printer is selected (ready to

receive data from the printer). The indicator is out when the printer is deselected and during self test.

TOF Switch: To set the first line position on each page (top of form), deselect the printer and press this switch when the print head is at the desired position. You can also select 17.1-character-per-inch printing with this switch by holding it down when turning printer power ON.

FORM FEED Switch: To advance the paper to the next page (top of form), press this switch while the printer is deselected. You can also select NLQ (near letter quality, page 76) with this button. Just hold down the FORM FEED button while you're switching on the printer.

ALARM Indicator: Lights when paper supply is low or exhausted (unless you use the command to disable the alarm, described on page 75). Printing stops until the paper supply is replenished.

LINE FEED Switch: If you want to advance the paper one line, press this switch while the printer is deselected. It is also used to perform a self test: turn ON the printer power while holding down this pushbutton.

The lever on the printer allows you to adjust the paper.

PAPER LOCK/RELEASE LEVER:
Open (slide forward) for inserting paper, for adjusting paper, and when using tractor feed computer paper. Close (slide back) for roll paper and for single sheets.

PAPER GAP ADJUSTMENT:
Slide toward the print head when inserting single sheets, and away when using multipart paper.

PAPER LOADING

You can load paper into the printer using several methods. If you have a printer stand with a paper slot, you can load paper through the bottom of the printer. If the printer is placed on a desk or table, paper can be loaded from the top, like typewriter paper.

If you have the optional roll paper stand or tractor feed unit, read the instructions below covering how to install them and how to load the paper.

When you use fanfold paper, adjust the distance between the sprocket pins at the ends of the platen correspond to the paper size. You can adjust the platen pin width by extending or compressing the platen ends.

To move the platen end: Unsnap the lever, move the platen end to the left or right, then close the lever.

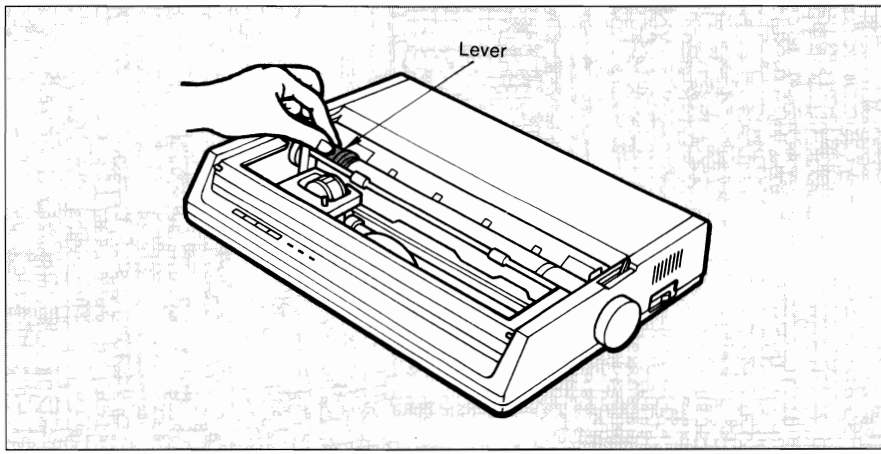
Bottom Feed Paper Loading

1 Set the printer on a slotted printer stand, carefully aligning the slot in the stand with the opening in the base of the printer.

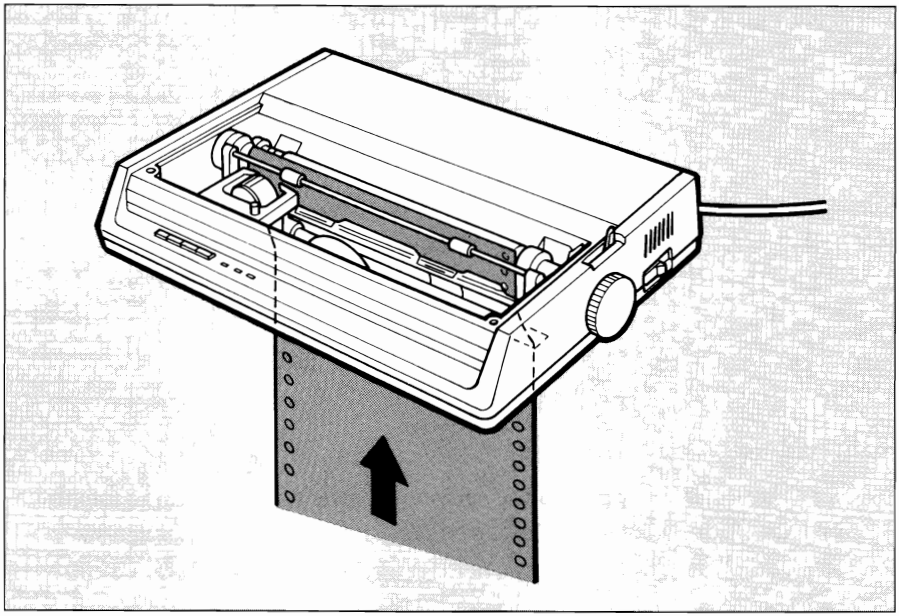
2 Place the box of paper under the printer stand.

3 Remove the access cover and lift the column indicator bar.

4 Open the paper release lever.



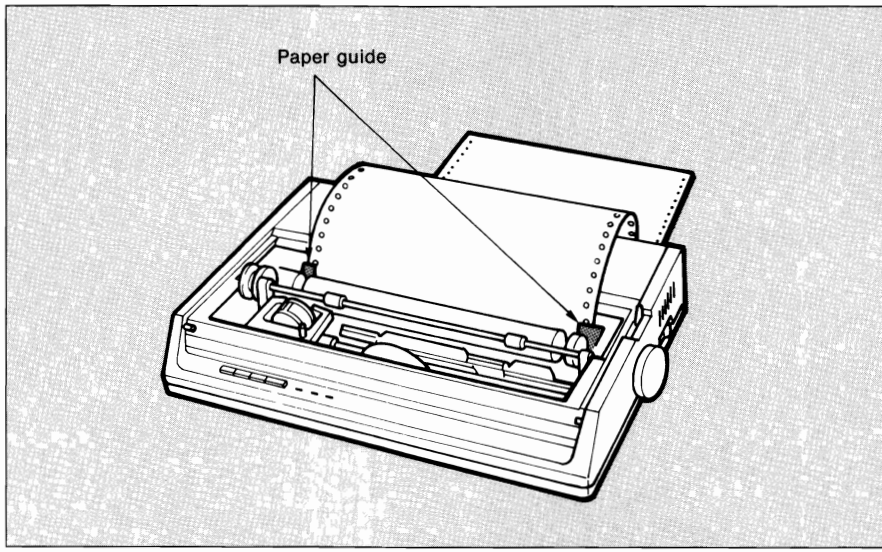
5. Insert the first sheet of paper in the opening in the bottom of the printer.



6. Slide the paper up until it appears in front of the platen.
7. Lower the column indicator bar.
8. Close the paper release lever.
9. Use the platen knob to advance the paper to the first printing line.
10. Replace the access cover.

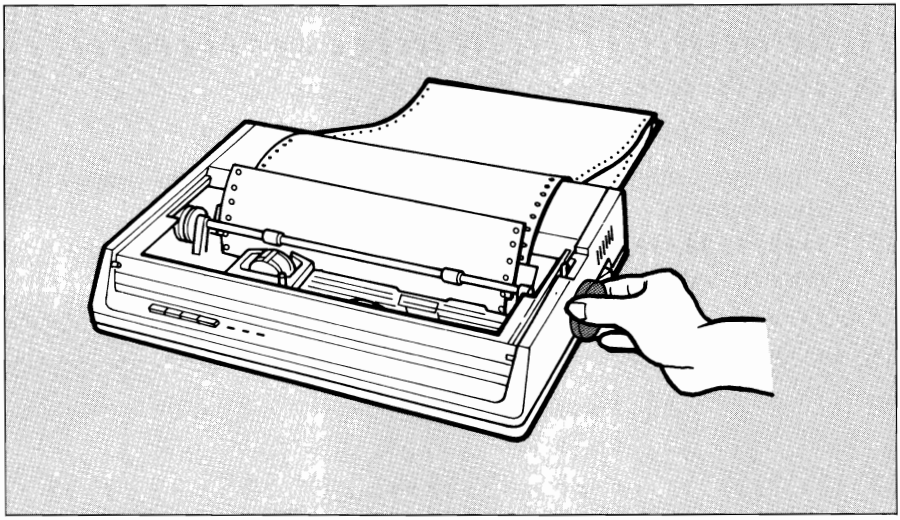
Rear Feed Paper Loading:

1. Set the printer on a desk or table.
2. Place the box of paper behind the printer.
3. Remove the access cover and lift the column indicator bar.
4. Open the paper release lever.
5. Insert the first sheet of paper in the paper guides.
6. Push the paper in just enough that its sprocket holes engage the sprocket pins located on the platen ends.
7. Turn the platen knob to advance the paper until it appears in front of the platen.

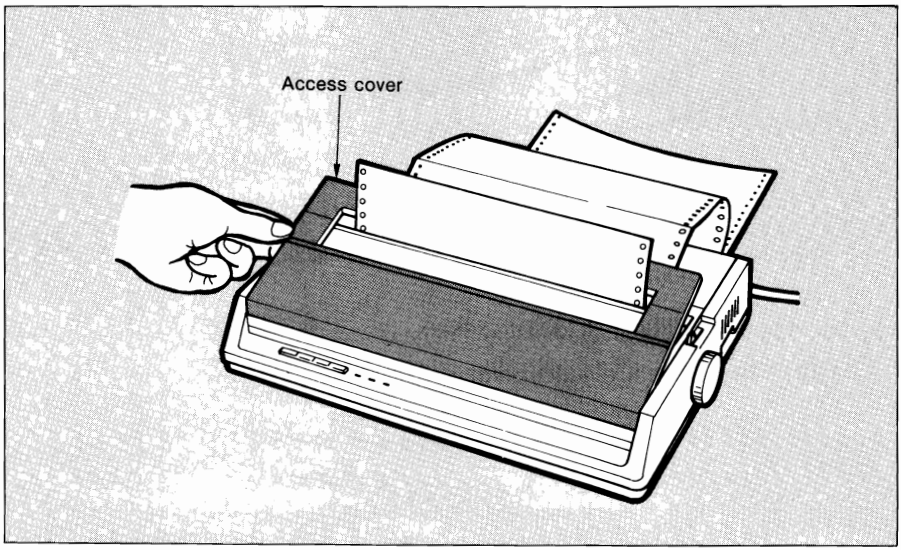


8. Lower the column indicator bar.
9. Close the paper release lever.

10. Use the platen knob to advance the paper to the first printing line.

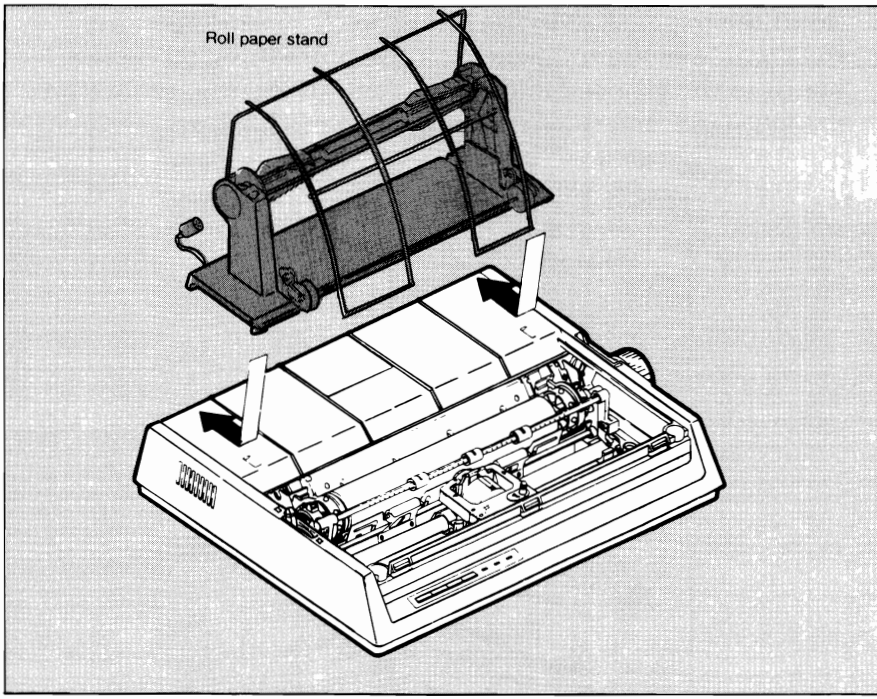


11. Replace the access cover.

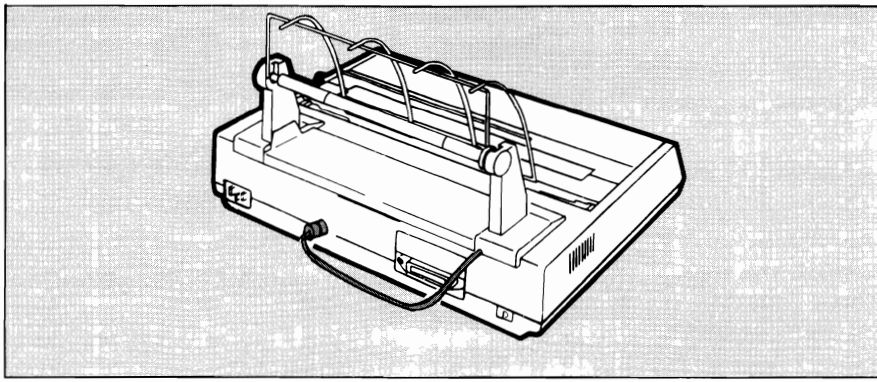


INSTALLING AND USING THE ROLL PAPER STAND

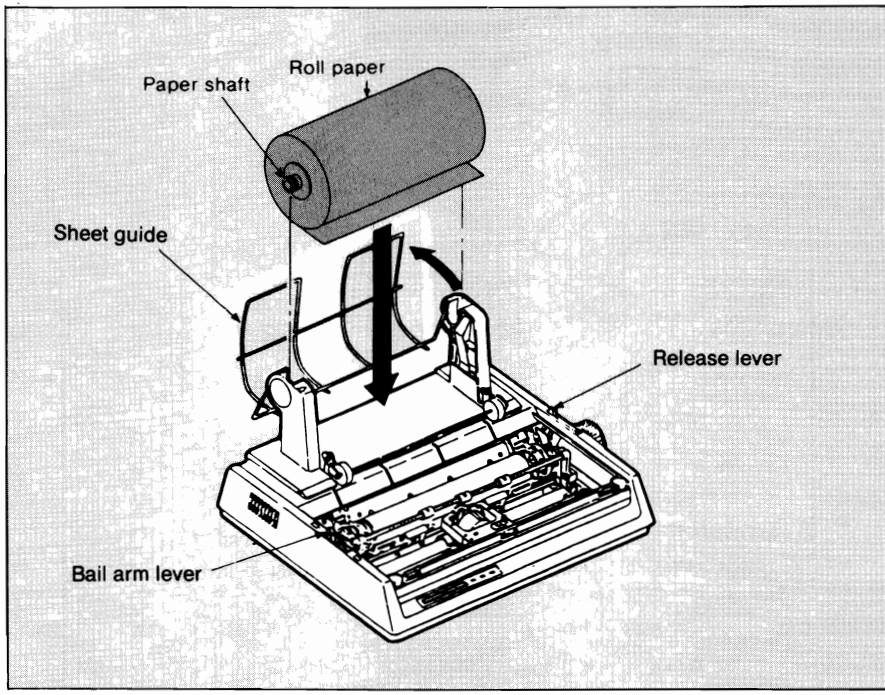
1. Remove the access cover.
2. Insert the tabs into the slots on both sides of the printer.



3. Plug the roll paper stand cord into the connector for the paper-near-end sensor at the rear of the printer.

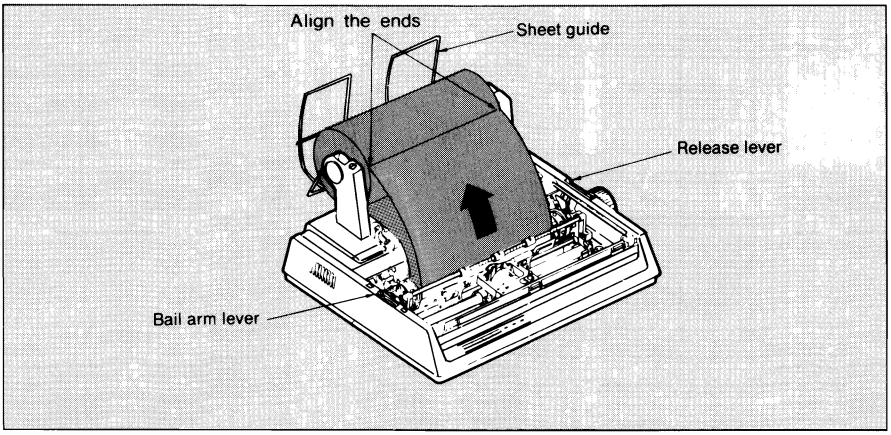


4. Pull the ball arm lever forward to move the column indicator away from the platen.
5. Place the paper release lever in the forward (open) position.
6. Insert the paper shaft in the roll paper core, and open the sheet guide of the roll paper stand. Mount the shaft on the stands so the grooved end of the shaft fits into the groove on the left stand, and the paper rolls from the bottom.

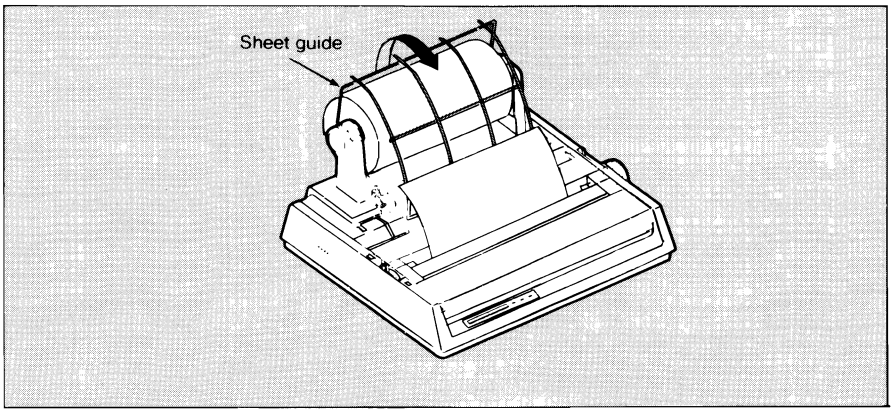


7. Insert the paper from the back of the platen, making sure its edges lie within the platen ends. (The sprocket pins would tear it!)
8. Push the paper in slightly. Now turn the platen knob to bring the paper to the front of the platen.

9. Pull the paper supplied to the front of the platen in Step 8 through the slit between the indicator and the platen, align the front ends of the roll paper along the feeder side, and close the release lever.
10. Close the bail arm lever.

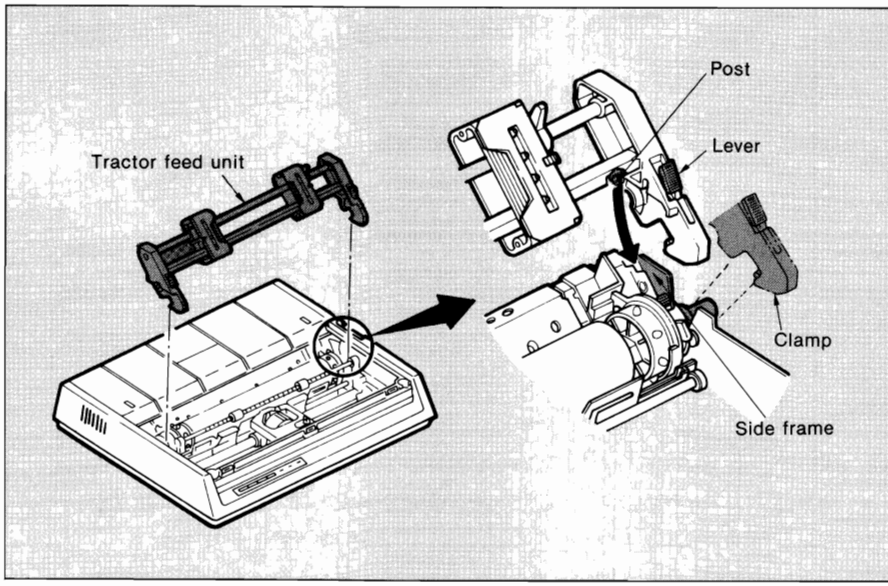


11. Replace the access cover: Fit the cover tabs into the slots at the printer front. Next lower the cover carefully, making sure the paper fits into the slot in the access cover.
12. By turning the platen knob, move the paper to the point where you want printing to start. (Remember that many wordprocessing packages automatically allow for a top margin of 25.4 mm (1 inch).)



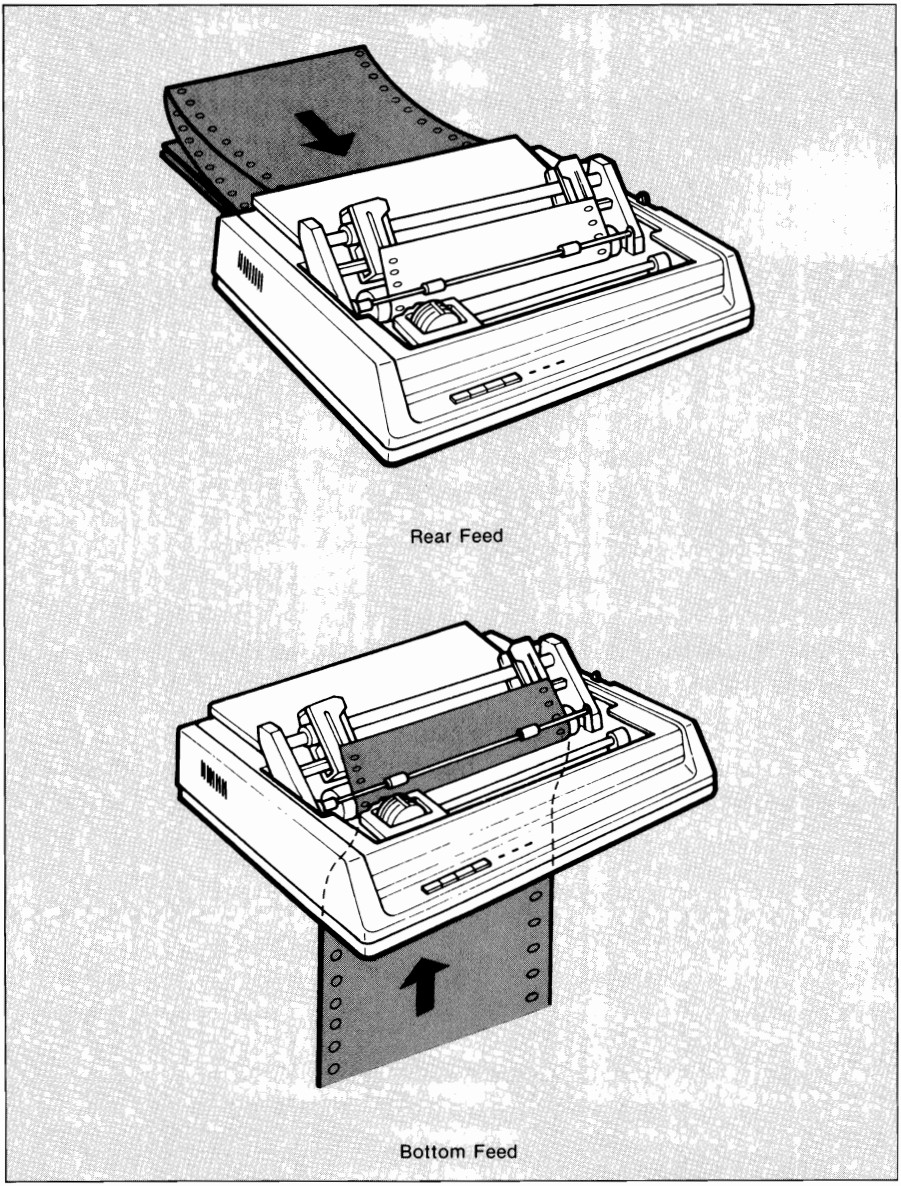
INSTALLING AND USING THE TRACTOR FEED UNIT

1. Remove the access cover that came with your printer.
2. Insert the posts in each end of tractor feed unit into the concave of the side frame.



3. Pull both sides of the tractor toward the front until the clamps snap into both platen ends.
4. Install the paper separator by placing its hooks in the slots provided on the printer body.

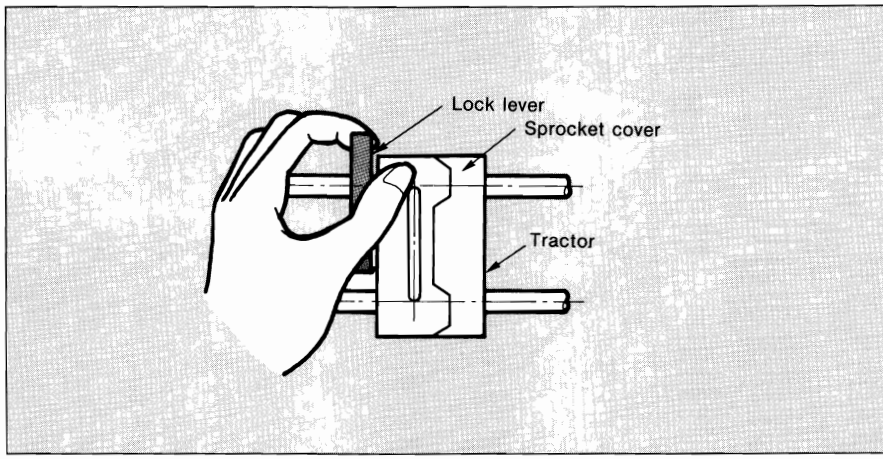
5. Load the paper from the top of the printer, or load it from the bottom if you have a slotted print stand.



Rear Feed

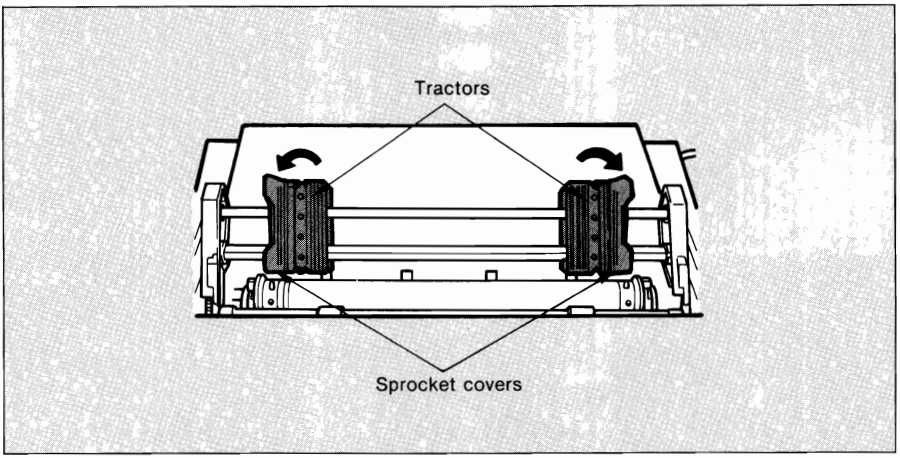
Bottom Feed

6. Adjust the left tractor if necessary; be sure it is no more than 12.7 mm (1/2 inch) to the right of the left end. To move the tractor, pull the lock lever open, slide the tractor to the desired position, then push it to lock it in place.

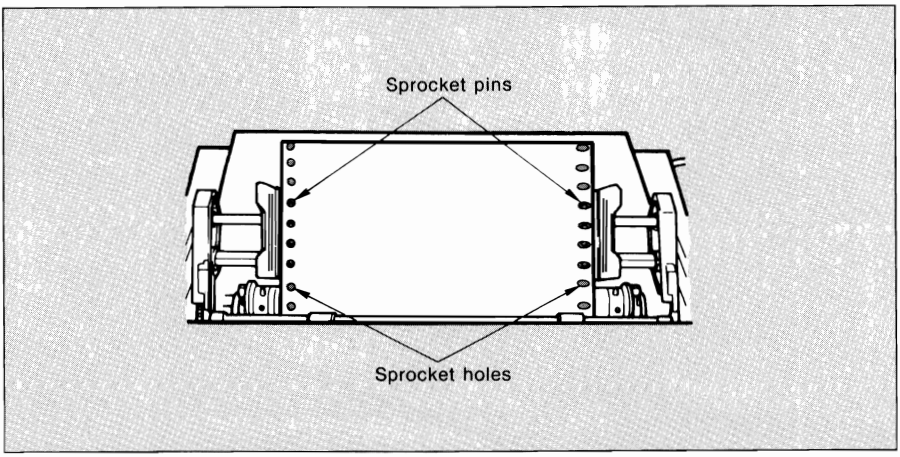


7. Pull the paper under the column indicator and up to the level of the tractor unit.
8. Adjust the right tractor to the paper width by pulling the lock lever open, sliding the tractor to the right or left (depending on the paper size), and pushing the lock lever to lock it in place.

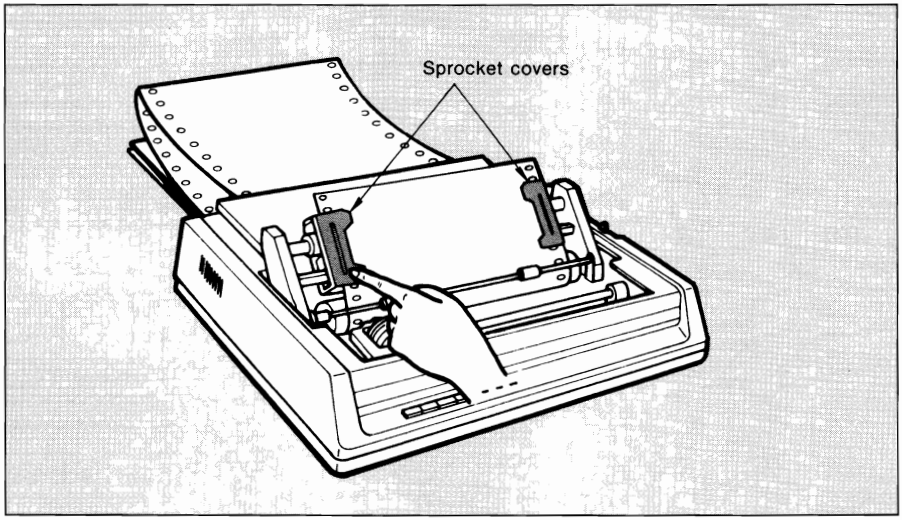
9. Open the sprocket covers and the paper release lever (slide forward).



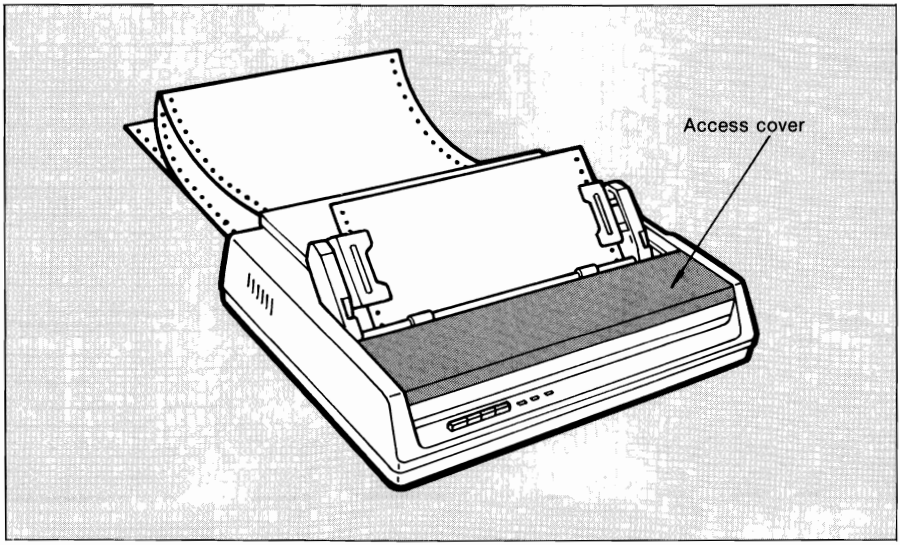
10. Place the sprocket holes in the paper over the sprockets on the tractor unit, making sure the paper is even.



11. Close both sprocket covers.

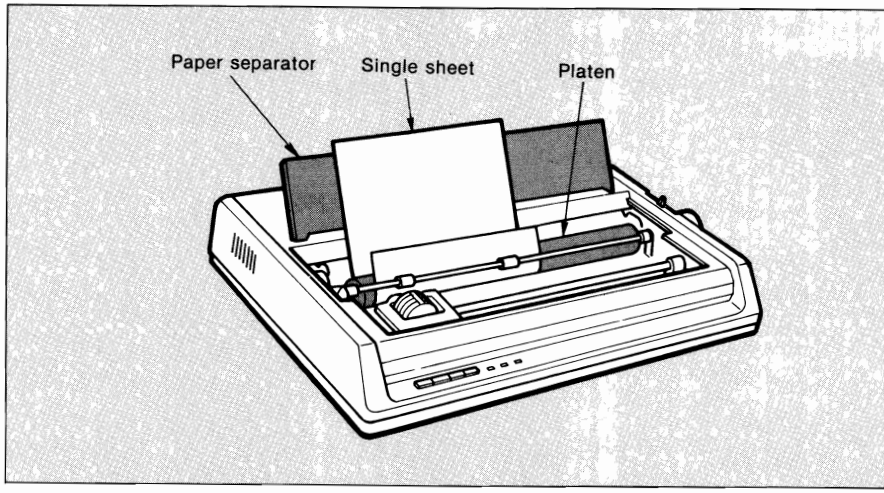


12. Insert the access cover.



INSERTING SINGLE SHEETS

1. Lift the column indicator bar.
2. Raise the paper separator as shown in the figure.
3. Slide the sheet into the paper guides.
4. Keep the paper release lever closed (slide back).
5. Use the platen knob to advance the paper around the platen and to the frist printing line.



6. Lower the column indicator bar.

Now you are ready to learn about programming to take advantage of the special printing effects of your ML182/183. If you do not know how to program, read chapter 3 for a quick explanation that may help you get started. If you have purchased a software package, such as Lotus 1-2-3 or WordStar, you may find some pointers in chapter 3 on how to program the IBM-compatible ML182/183 features into your packaged software.

CHAPTER 3.
PROGRAMMING

CHAPTER 3 PROGRAMMING

Now that you are familiar with the outside of the printer, you can begin printing documents using the "default settings" of the pritner, that is, the kind of printing your ML182/183 is set up to do when you turn it on:

Utility mode*
10 characters per inch
6 lines per inch
Horizontal tabs at every 8th character
Vertical tabs at 1-inch intervals

This may be all you ever need.

If you plan to print tables, charts, graphics, or documents with indented text, subscripts, superscripts, etc., however, you should read this chapter to learn how and when to use the special printing features.

First, here are the available printing options:

Carriage Return:	If your computer does not automatically add a carriage return at the end of a line, you may add one to your program.
Unidirectional Printing:	With this method, characters are printed from left to right, which is useful for tables and charts where exactness counts.
Horizontal Tabs:	Sets tabs at predetermined intervals; perfect for accounting reports, tables, and charts.
Left Margin Set:	Changes the left margin for indented text.
Line Spacing:	Gives you a choice of 6 or 8 lines per inch.
Formatting:	Adjusts printing to a particular paper size, controls the line where printing begins, and automatically advances the paper when less than 1 inch remains at the bottom of a page. See skip over perforation function.

** : NLQ mode will be selected by pushing FORM FEED switch during power-up.*

Skip Over Perforation:	If you use fanfold paper with your printer, you may need to use this command to instruct the printer to automatically advance the paper over the perforations.
Character Pitch:	You can change from 10 to 12 or 17.1 characters per inch and you can also double the character width (10 characters per inch to 5 characters per inch, 12 characters per inch to 6 characters per inch and 17.1 characters per inch to 8.5 characters per inch).
Enhanced/Emphasized:	Prints characters in a bolder type, commonly used for titles and subtitles.
Underlining:	Underlines a word or group of words.
Character Sets:	Choose from two different character sets; IBM character set either I or II is selectable (see page 56). There is also a switch selection which enables you to power up the printer in either set and to establish the default character set.
APA Graphics:	Enables you to draw graphs, charts, and pictures.
Cancel:	Clears the data in the print buffer.

What you do next depends on whether you have invested in a software package. If you have, skip to page 43 for advice on how to add these features to your prepackaged software. If you do not have a software package, continue reading.

The printer will not do certain things unless you specifically tell it to. You instruct the printer to change the way it prints by sending special codes through your computer. When you write a program, you include the codes for printing features you want in your program. In BASIC, for example, include them in an LPRINT statement.

BASIC TRAINING

If you are familiar with programming, skip this section and go straight to the control codes starting on page 45.

Although we wrote our examples in MicroSoft's BASIC programming language, the principles are similar for other languages. The examples demonstrate how to select a few of your printer's special features and try them. Later the features are explained in detail.

An LPRINT statement, or print statement, tells the computer to send information to the printer. Take a minute to check your BASIC maual to find out what form this takes in your version of BASIC.

Make sure your printer is ready to print (ribbon in, paper loaded, power ON, SEL indicator lit) and experiment a little with the print commands.

1. Type the following one-line program:

```
10 LPRINT "WHO YOU GONNA CALL?"
```

2. Press ENTER, then RETURN or CR.

3. The printer springs into action, printing this on the paper.

```
WHO YOU GONNA CALL?
```

Computers cannot understand letters. They use only numbers, more specifically, binary numbers (1s and 0s). When carrying out an LPRINT command, the computer sends the printer a code number for each character (letter, symbol, punctuation mark) within the quotation marks. As the printer receives each number, it prints the dot pattern associated with that number.

The American Standard Code for Information Interchange (before known as ASCII) is the standard code used by computers. Appendix D gives the ASCII code numbers along with their hexadecimal, binary, and decimal equivalents. You can enter these ASCII numbers directly in your LPRINT statement by using the CHR$ (Character String) function.

The CHR$ command sends the ASCII command in parentheses to the printer. For example, we can write a program this way:

```
LPRINT CHR$(79);CHR$(75);CHR$(73);CHR$(68);CHR$(65);
CHR$(84);CHR$(65)
```

This is obviously a tedious way to write, but you need to understand the concept when you want to use certain commands.

Keep in mind that there is a big difference between ASCII code numbers and numbers that are printable characters. For example, if you want to print the number 1 using an LPRINT statement, you would type this:

```
LPRINT CHR$(49)
```

You can also print numbers and symbols by putting them within quotes, like this:

```
LPRINT "1"
```

So far, we have discussed printable characters, ASCII codes located between decimal 32 and decimal 127. Non-printable codes, located between 0 and 31, do not tell the printer to print something. They instruct the printer how to print something. The ASCII chart in the back of this handbook shows that these codes have abbreviations, such as FF and US. Some of these abbreviations make sense (FF, for instance, stands for form feed) but others do not unless you are a telecommunications expert.

Let's try a few, starting with the ASCII non-printable code US. When the printer receives the SO command, it will print the next data with double width.

```
10 LPRINT "HELLO"
20 LPRINT CHR$(14);"HELLO"
```

Now run the program. This is what you should get:

```
HELLO
HELLO
```

ASCII code SO is non-printable, so you must use the decimal or hexadecimal form of the command within a CHR$ statement. Nothing in quotes will work. Like most commands that change the way the printer is printing, the SO (double width) command remains in effect until either the end of a line is reached or you send a command to cancel it. See what happens if you run the sample program a second time:

```
HELLO
HELLO
```

The second time, the first line is printed standard width. Because the SO command is not in effect by the end of a line. To return to standard size printing (10 characters per inch) you have to put in CHR$(30), like this:

```
20 LPRINT CHR$(14);"HELLO";CHR$(20) "  ␣␣␣ HELLOW AGAIN"
```

NOTE: *␣ means space.*

That is what you should get:

```
HELLO
HELLO    HELLO AGAIN
```

To avoid any unpleasant surprises, you may want to insert codes at the end of a document to cancel whichever feature(s) you selected and to reset the printer to the normal startup condition.

ESCape Sequences

Many of your IBM-compatible MICROLINE 182/183 printer's special printing features are controlled by a combinaton of ASCII codes beginning with the non-printable code, ESC. Commonly called an ESCape sequence, this alerts the computer to interpret the next code number as part of an instruction, not as a printable character. For example, if you want to put tab stops at every fifth column, you would use the ESCape sequence ESC D (5) NULL. (5) is binary. Looking at the ASCII chart on page 129, this is how you would change the horizontal tab command into BASIC:

```
10 LPRINT CHR$(27);CHR$(65);CHR$(12);
or
10 LPRINT CHR$(27);"A";CHR$(12)
```

This is just a quick overview to help you get started with programming; obviously this is not all you need to know. As you become more experienced with this handbook, you will find some shortcuts and tricks to make programming even easier. We hope we have given you enough information to get you started.

IF YOU HAVE A SOFTWARE PACKAGE

Software packages make the printer's special features, such as smaller type fonts, subscripts, underlining, etc., much easier to use. To add the features to your package, read your software documentation for instructions, paying particular attention to any limitations—for example, some software packages let you select a printing feature for an entire document but do not allow you to change features within a document. Other packages may not accept the page formatting commands, such as horizontal tabs, which are available with your printer.

When you install your package, you probably need to select the features you're going to be using from a list called a "menu." Several software packages actually list names of printers on the menu, so that all you need to do is select the IBM Graphic/5152 printer from that list—the software package will then automatically use the commands for your printer. If they aren't on the menu, pick the closest general description; "Teletype printer that doesn't backspace" is often the best.

With some software packages, such as WordStar™, you can easily modify or install your program to accept your printer's commands by inserting codes into the program. Still other software packages let you embed commands within a document itself by preceding the command with "/OUT" or something similar. VisiCalc™ is a popular package that provides a "setup" option as part of the printing procedure— you simply specify at the beginning of a document what printing features you will be using.

If your computer is equipped with BASIC, you have an alternative to selecting features. After you load BASIC, run a simple one- or two-line program telling the printer to change a feature(s).

Without turning the printer off, load and run your software package. For example, suppose you wanted to print at 12 characters per inch:

1. Load BASIC
2. Type the command: LPRINT CHR$(18)

NOTE: *You do not have to know how to program to do this, but be sure to check your computer documentation to see what statement to use (we use LPRINT) before each command. Not all versions of BASIC are the same.*

3. Press ENTER, then RETURN or CR.
4. Without turning the printer off, enter your software package.

What you just typed causes the computer to send a command to the printer to go into 12 characters per inch mode. When you load and run your software, all printing thereafter will be at 12 characters per inch until you turn the printer off or send a command to change the characters per inch setting.

There is one exception to this method, however: You cannot use this method if your computer sends an "I-Prime" signal before you load a program. An "I-Prime" signal is sent by some computers to cancel any special commands that were previously in effect so that you can start fresh with each new document.

Basically if you are using a software package, just follow the instructions in the software manual or ask your dealer for the OKI USERS TIP that can help you. OKI publishes these instructions to make setting up and using various popular software packages with OKI printers much easier.

PROGRAMMING THE ML182

For each printing feature explained in this chapter, we list three different forms of each code as follows:

ASCII	Decimal	Hexadecimal
ESC 1 Standard abbreviation in ASCII-used for reference	CHR$(27);CHR$(49) Decimal code presented in the format most often used. A variation of the same command is CHR$(27);"1"	1B 31 Hexadecimal code used by some software packages to enter printing commands. A variation of the same command is CHR$(&H1B); CHR$(&H31)

CARRIAGE RETURN AND LINE FEED

ASCII	Decimal	Hexadecimal
CR	CHR$(13)	0D

Carriage return tells the printer to print the line of data and returns the print head to the left side of the page. IBM PC adds a line feed after a carriage return unless 128 is added to the command. If you send a CHR$(141), therefore the result is a carriage return only.

ASCII	Decimal	Hexadecimal
LF	CHR$(10)	0A
VT	CHR$(11)	0B

Line feed advances the paper one line; line spacing is 1/6 inch unless it is reset using the command on page 47.

HORIZONTAL TABULATION

ASCII	Decimal	Hexadecimal
ESC D0	CHR$(27);CHR$(68);CHR$(0)	1B 44 00

Horizontal tabs are set at every 8th character when power is first switched ON. To eliminate the tab settings, use the ESC D 0 command.

HORIZONTAL TABBING

ASCII	Decimal	Hexadecimal
HT	CHR$(9)	09

Advances to the next tab position which occurs every 8th character. The command is ignored if it exceeds the right margin or the maximum number of settings.

```
10 LPRINT CHR$(27);CHR$(9);CHR$(10);
20 LPRINT CHR$(9);"TAB"
30 LPRINT CHR$(9);"TAB AGAIN"
```

```
TAB      TAB AGAIN
```

LINE SPACING

The default line spacing for the IBM-compatible ML182/183 printer is 6 lines per inch. This means that when the printer power is turned on, the spacing from the bottom of one line to the bottom of the next line on the same page is automatically set to 1/6 inch. This is also the normal spacing of a standard typewriter.

You can change the line spacing to 8 lines per inch to fit more lines of printing per page, and for special effects, you can also vary line spacing in multiples of 1/72 or 1/126 inch. This affects space between lines only, not the height of the characters.

ASCII	Decimal	Hexadecimal
ESC 0	CHR$(27);CHR$(48)	1B 30

The ESC 0 command sets line spacing to 1/8 inch.

ASCII	Decimal	Hexadecimal
ESC 1	CHR$(27);CHR$(49)	1B 31

The ESC 1 command sets line spacing to 7/72 inch.

ASCII	Decimal	Hexadecimal
ESC A n	CHR$(27);CHR$(65); CHR$(1~85)	1B 41 01-55

The ESC A command is a user-selectable line space setting that enables you to choose a setting in increments of 1/72 inch. You can select a maximum line space setting of 85/72 inches, which is the equivalent of one printed line every 1-13/72 inches.

ASCII	Decimal	Hexadecimal
ESC 2	CHR$(27);CHR$(50)	1B 32

The ESC 2 command implements the line spacing set by the ESC A command. Should no ESC A command precede the ESC 2 command, the default line spacing (6 LPI) will be activated by the ESC 2 command.

FINE LINE SPACING

ASCII	Decimal	Hexadecimal
ESC 3 n	CHR$(27);CHR$(51); CHR$(1 ~ 255)	1B 33 01-FF

The ESC 3 command is a user-selectable line space setting command that lets you shoose a setting in increments of 1/216 inch. You can select a maximum line space setting of 255/216 inches, which is the equivalent of one printed line every 1-39/216 inches. (See NOTE).

ASCII	Decimal	Hexadecimal
ESC J n	CHR$(27);CHR$(74); CHR$(1 ~ 255)	1B 4A 01-FF

The ESC J command allows you to interrupt the set line spacing and reset the line spacing for a single line to a multiple of 1/216 inch. You can select a maximum space setting of 255/216 inches, which is the equivalent of a 1-39/216 inches line space. Upon receipt of the ESC J command, the printer prints out the line containing the command and advances the paper the distance specified by the command. Line spacing then returns to the previous setting, and the printer continues to print. (See NOTE).

NOTES TO ESC 3 AND ESC J: *The standard IBM printer advance is expressed in multiples of 1/216 inch. IBM-compatible MICROLINE hardware performs paper advances in multiples of 1/144 inch rather than 1/216 inch; therefore, MICROLINE software automatically multiplies the number specified in ESC 3 and ESC J statements by 2/3 to perform the most precise IBM emulation.*

If the multiples specified in your ESC 3 or ESC J statements are not evenly divisible by 3, fine line spacing may be slightly more or slightly less than you specified. If the number you selected leaves a remainder of 1 when it is divided by 3, spacing will be slightly less than specified. If the number you selected leaves a remainder of 2, spacing will be slightly more than specified. When the number you select is evenly divisible by 3, fine line spacing is always exact.

The ESC A line spacing selection, which selects line spacing in multiples of 1/72 inch, is always absolutely precise.

PAGE LENGTH SETTING

ASCII	Decimal	Hexadecimal
ESC C n(n)	CHR$(27);CHR$(79);"67" CHR$(1~127)	1B 43 01-FF

The printer page length set is user selectable in either inch or line increments where n is either a two or three digit number. Selectable line length settings range between 1 to 127; selectable inch length settings range between 1 to 22. The line length default setting is 66 lines per page (11 inches) with a 6 LPI line spacing. You can also set page length usig the internal switch settings (see page 17).

TOP OF PAGE

ASCII	Decimal	Hexadecimal
ESC S	CHR$(27);CHR$(53)	1B 35

The top margin on a page can be set by issuing this command. Wherever the print head is at the time this command is given will be the first printing line. You can also set the top of page using the TOF switch on the outside panel (see page 22).

FORM FEED

ASCII	Decimal	Hexadecimal
FF	CHR$(12)	OC

Prints the data in the print buffer, returns the carriage, then advances the paper to the top margin of the next page.

NOTE TO TRS-80 OWNERS: *This command is not valid with your computer.*

SKIP OVER PERFORATION

ASCII	Decimal	Hexadecimal
ESC N n	CHR$(27);CHR$(78); CHR$(n) (1 ~ 127)	1B 25 53 n (01-FF)

If n is any value between 1 and 127, the printer automatically advances to the top margin of the next page when there is only 1 inch left at the bottom of a page. (This command is ignored if the value of n is more than page length.)

To stop the printer from automatically skipping to the next page (for roll paper or forms longer than 12 inches), n equals 0.

In BASIC format, the value of n must appear in a CHR$ statement.

CHANGING CHARACTER SIZE

ASCII	Decimal	Hexadecimal
DC2 (10 CPI)	18	12
ESC (12 CPI)	27 58	1B 3A
SI (17.1 CPI)	15	0F
SO (double width)	14	0E
DC4 (cancels double width before line end)	20	14
ESC W 1 (turns double width on permanently)	27 87 49	1B 57 31
ESC W 0 (turns double width off permanently)	27 87 48	1B 57 30

The character size switches to 10 characters per inch (CPI) after the printer receives the DC2 command. The character size becomes 12 CPI when the ESC: command is received and 17.1 CPI when the SI command is received.

NOTE: *When the power is turned on while the TOF switch is depressed, the printer is set to 17.1 CPI. You can also set the printer to 17.1 CPI at power ON by setting internal switch 2 to the condensed print mode. The printer will print in 17.1 CPI until power is turned OFF or a command is sent to change the character size.*

You can double the width of 10-, 12-, and 17.1-CPI print by inserting the US command after the character size you want doubled. This command doubles the size of characters that follow the command on one line. The DC4 command can also be implemented on the same line as an SO command. The DC4 command cancels double-width printing before the end of a line. This enables you to emphasize specific words or characters within a single line, and to automatically return to your preselected type size.

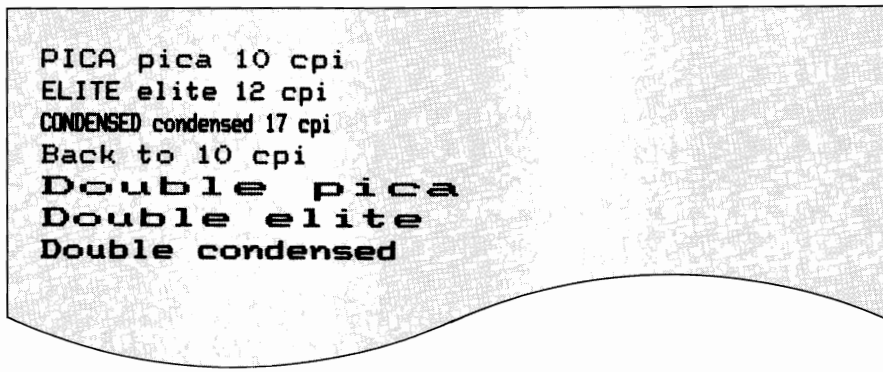
The ESC W 1 and ESC W 0 commands override both DC4 and SO commands, and can be utilized to either permanently implement or cancel double-width printing within a program or document. The ESC W 1 command implements double-width printing; the ESC W 0 command cancels it.

Character size can be changed in the middle of a line unless your software package does not allow you to do that. The table below indicates the maximum number of characters per line in each character size:

Size	Command	Maximum Characters per line	
		ML182	ML183
10 CPI	DC2	80	136
12 CPI	ESC:	96	163
17.1 CPI	SI	132	233
5 CPI	DC2 SO	40	68
6 CPI	ESC: SO	48	81
8.5 CPI	SI SO	66	116

NOTE: *Some forms of BASIC will not allow you to print more than 80 characters on a line. Check your BASIC manual to see if you can override this limitation by using a WIDTH statement.*

```
10 LPRINT CHR$(18);"PICA pica 10 cpi"
20 LPRINT CHR$(27);"ELITE elite 12 cpi"
30 LPRINT CHR$(15);"CONDENSED condensed 17 cpi"
40 LPRINT CHR$(18);"Back to 10 cpi"
50 LPRINT CHR$(14);"Double pica"
60 LPRINT CHR$(27);"CHR$(14);"Double elite"
70 LPRINT CHR$(15);CHR$(14);"Double condensed"
```



UNDERLINING

ASCII	Decimal	Hexadecimal
ESC -1	CHR$(27);CHR$(45);CHR$(1)	1B 2D 01
ESC -n (n: even)	CHR$(27);CHR$(45);CHR$(0)	1B 2D 00

Use the ESC -n (n: odd) command to start underlining a word or group of words. Use the ESC -n (n: even) command to stop underlining. The printer will continue to underline until the command is given to stop it (either ESC -n (n: even) or the printer is powered down). (Because the underline is drawn by the ninth dot, the last dot in some descender characters will be overlapped.)

Underlining under the spaces designated by horizontal tabs is available also.

```
10 LPRINT "This line isn't underlined"
20 LPRINT CHR$(27)"-";CHR$(1);"but this line is underlined."
30 LPRINT CHR$(27)"-";CHR$(0);"This line isn't underlined."
```

```
This line isn't underlined
but this line is underlined.
This line isn't underlined.
```

SUPERSCRIPTS/SUBSCRIPTS

ASCII	Decimal	Hexadecimal
ESC S0	CHR$(27);CHR$(83); CHR$(0)	1B 58 00
ESC S1	CHR$(27);CHR$(83); CHR$(1)	1B 58 01
ESC T	CHR$(27);CHR$(84)	1B 54

If you want to print superscript characters (characters appearing above the normal print line), send the ESC S0 command before the characters, symbols, or word(s) you want printed in superscript. To return to printing on the normal print line, use the ESC T command.

If you want to print subscript characters (characters appearing below the normal print line), use the ESC S1 command before entering the characters. To return to printing on the normal print line, use the ESC T command.

Superscript and subscript characters are printed in normal characters.

NOTE: *Printing returns to the normal line when ESC S0 is used to cancel subscript or ESC ST is used to cancel superscript.*

```
10 LPRINT "This is a ";
20 LPRINT CHR$(27);"S";CHR$(0);"superscript"
30 LPRINT CHR$(27);"T";"This is a";
40 LPRINT CHR$(27);"S";CHR$(1);"subscript"
50 LPRINT CHR$(27);"T";"This is back to normal."
```

```
This is a superscript
This is a subscript
This is back to normal.
```

ENHANCED/EMPHASIZED PRINTING

ASCII	Decimal	Hexadecimal
ESC E	CHR$(27);CHR$(69)	1B 45
ESC F	CHR$(27);CHR$(70)	1B 46
ESC G	CHR$(27);CHR$(71)	1B 47
ESC H	CHR$(27);CHR$(72)	1B 48

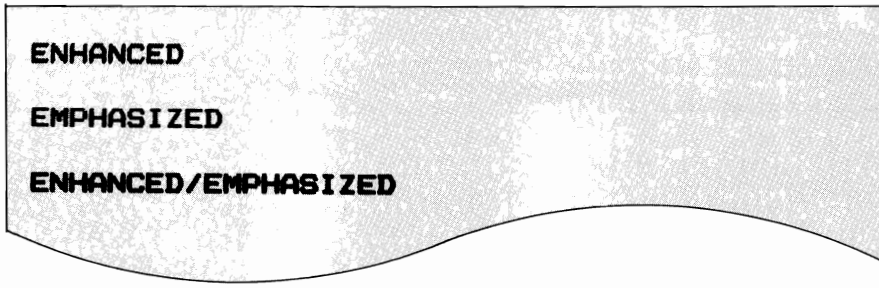
Enhanced printing provides a deeper resolution of each character because each dot contained in a normal character is doubled vertically, creating a darker impression. The ESC G command is a good feature to use for headlines and subtitles and can be used in conjunction with double-width characters.

Emphasized printing, obtained by entering the ESC E command, causes each character to be doubled horizontally, creating a bolder image for titles, subtitles, or emphasizing word(s) within a document.

To return to the normal character set from emphasized mode, enter the ESC F command. To return to the normal character set from enhanced mode, enter the ESC H command. Neither feature is available for subscripts or superscript characters nor in line graphics.

Emphasized and enhanced printing can also be done simultaneously for special effects.

```
10 LPRINT CHR$(27);CHR$(71);"ENHANCED"
15 LPRINT CHR$(27);CHR$(72)
20 LPRINT CHR$(27);CHR$(69);"EMPHASIZED"
25 LPRINT CHR$(27);CHR$(70)
30 LPRINT CHR$(27);CHR$(71);CHR$(27);CHR$(69);
   "ENHANCED/EMPHASIZED"
35 LPRINT CHR$(27);CHR$(72);CHR$(27);CHR$(70)
```



CHARACTER SETS

ASCII	Decimal	Hexadecimal	Character Set
ESC 6	CHR$(27);CHR$(54);	1B 36	II
ESC 7	CHR$(27);CHR$(55);	1B 37	I

If you use Spanish for all your documents. It is better to make the selection on the internal switches (see page 17) so that the printer normally uses that language.

BIT IMAGE GRAPHICS

ASCII	Decimal	Hexadecimal
ESC K	CHR$(27);CHR$(75)	1B 4B
ESC L	CHR$(27);CHR$(26)	1B 4C
ESC Y	CHR$(27);CHR$(89)	1B 59
ESC Z	CHR$(27);CHR$(90)	1B 5A

Using bit image graphics, you can draw almost any kind of illustration with your printer.

Bit image graphics mode enables your printer to "draw" almost any kind of illustration by printing a dot at any location on the page. Your IBM-compatible MICROLINE will work properly with any graphics software package designed for the IBM Personal Computer and IBM Graphics Printer. No software modification is required; images will be printed without distortion.

If you have IBM DOS 2.0, you can use a software package (or BASIC commands such as CIRCLE, LINE, and DRAW) to create an image on the display screen (your software or BASIC manual will explain how), then "dump" it onto the page via the Prt Sc command key on your computer. The next section, "Screen Dumps," gives some examples.

The section called "Programming Bit Image Graphics" explains what you need to know in order to write your own graphics programs in BASIC without using the screen dump method.

SCREEN DUMPS

This IBM Personal Computer feature lets you print a reproduction of any image on your display screen. Simply press the SHIFT key and the Prt Sc key at the same time; whatever is on the screen will be printed on the page.

This section gives examples of the screen dump feature. In the first example, we use the "pie chart" program on your Supplemental DOS disk, and in the second, we create a design with BASIC graphics commands.

NOTE: *You must have DOS 2.0 to use the Prt Sc key for screen dumps. Before you try the examples, follow these steps:*

1. Place the IBM DOS 2.0 disk in drive A and the Supplemental DOS disk in drive B of your computer.
2. "Boot" the system.
3. When the prompt sign ("A>") appears, type:

   GRAPHICS <CR>

   ("<CR>" indicates pressing the Enter key, which is marked with an angled arrow.)
4. When you see the prompt sign again, type:

   BASICA <CR>.

EXAMPLE 1: Pie Chart

When you see the prompt again after following the steps above, type:

B:PIECHART <CR>

When the prompt returns, type:

RUN <CR>

The program will tell you how to enter information, and when you finish, the pie chart will appear on the screen. Then just press both the SHIFT and the Prt Sc keys at the same time. That is all you need to do. The printer will print the chart on the paper, which should look something like the figure on next page.

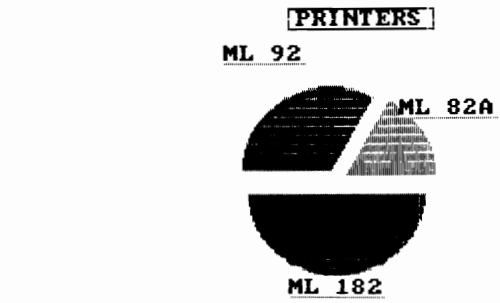


FIGURE 1

Example 2: BASIC Graphics

In this example, we use the DRAW statement in IBM BASIC to create a pattern on the screen and then print it out. Other statements you can use include CIRCLE and LINE; see your IBM BASIC manual for details of how these statements work.

Keep in mind that a screen dump will print out everything that appears on the screen including menus, prompts, error messages, etc., which you may not want printed. Our sample program shows some ways to suppress unwanted parts of the display.

If you just tried Example 1, enter "N" when the program asks "Another Chart? (Y or N)," then type NEW; this returns you to BASIC.

Enter the following program:

```
  5 KEY OFF
 10 SCREEN 1
 15 CLS
 20 DRAW"EM0,0R320D200L320U200"
 30 DRAW"BM50,50R220D100L220U100"
 40 DRAW"BM75,75R170D50L170U50"
 50 DRAW"BM0,0F400"
 60 DRAW"BM320,0G400"
 70 DRAW"BM160,0D200"
 80 DRAW"BM0.100R320"
1000 GOTO 1000
```

PROGRAM NOTES:

Line 5 erases the display of function key values so they are not printed.

Line 10 activates the medium-resolution graphics screen.

Line 15 clears the screen.

Lines 20 to 80 draw the pattern on the screen.

Line 1000 is an "infinite loop" that keeps the computer occupied. If you omit this line, or put an END statement in the program, the screen will display a prompt sign when the program is completed. If you put in a STOP statement, the screen will display "Break in 1000." In these cases, the prompt or break message would also appear on your printout; line 1000 in our program prevents this from happening. When you want to stop the program after performing the screen dump, press the BREAK key.

RUN the program, and when the graphics pattern appears on the screen, simply press the SHIFT and Prt Sc keys at the same time; the printer will then print the image shown below. When you finish, press the BREAK key to stop the program.

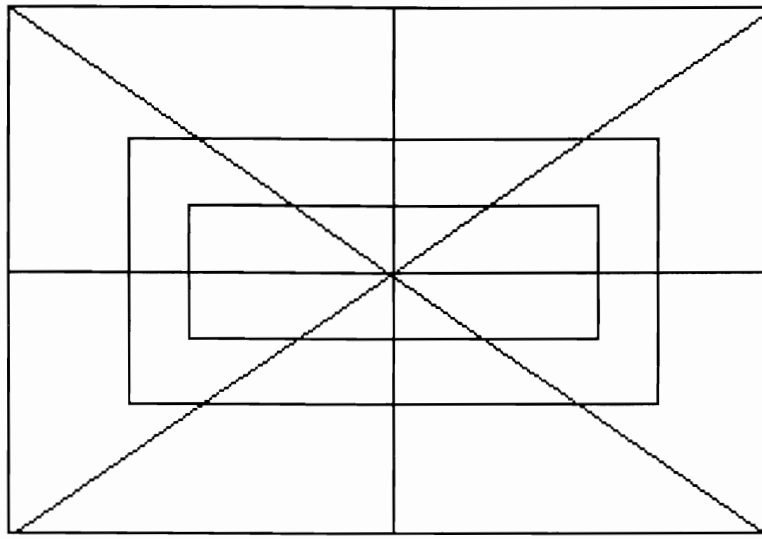


FIGURE 2

PROGRAMMING BIT IMAGE GRAPHICS

You can also write a program that prints a graphics image directly, without transferring it from the display screen. This section explains how to do this using BASIC statements.

Your printer prints graphics images in successive columns of eight dots. The LPRINT statement that tells the printer to do this has three components:

- The control code sequence that puts the printer into graphics mode,
- The number of columns to be printed, and
- The coded data that tells the printer which dots to print in each column.

First, we discuss each part separately, then put them together.

There are four modes of bit image graphics available with the IBM-compatible MICROLINE. They differ in horizontal resolution, or density. This indicates how close together the dots are; it is measured by the number of dots per inch. All modes have a vertical resolution of 72 DPI. For reference, the diameter of a dot is 1/72 inch. The modes are discussed in more detail in the next section on control codes.

The maximum width of a graphics image is 8 inches for the ML182.

1. Control Codes

A graphics LPRINT statement begins with a control code that tells the printer to print a graphics image. Each graphics mode has a different control code.

ESC K	CHR$(27);CHR$(75)		1B 4B (hex)
	Single Density		60 x 72 DPI
		ML182	ML183
	Max. dots/line	480	816
	Max. dot res.	480	816
ESC L	CHR$(27);CHR$(76)		1B 4C (hex)
	Double Density, half speed		120 x 72 DPI
		ML182	ML183
	Max. dots/line	960	1632
	Max. dot res.	960	1632
	In this mode, the printhead slows down so it can print dots that overlap by about 1/2 dot width.		
ESC Y	CHR$(27);CHR$(89)		1B 59 (hex)
	Double Density, normal speed		120 x 72 DPI
		ML182	ML183
	Max. dots/line	480	816
	Max. dot res.	960	1632
	This mode has the same density as ESC L and prints at normal speed; however, you cannot print dots in the same row in adjacent columns. In other words, after you have printed a dot in one particular row, you can't print on that row in the next column.		
ESC Z	CHR$(27);CHR$(90)		1B 5A (hex)
	Quadruple Density		240 x 72 DPI
		ML182	ML183
	Max. dots/line	640	1088
	Max. dot res.	1920	3264
	This mode prints dot columns that overlap by about 3/4 dot width. It can print only every other dot on the same row. In other words, after you have printed a dot in one particular row, you can't print on that row in the next column.		

NOTE: *Take a minute to think through the restrictions on the ESC Y and ESC Z graphics modes. Basically, it just means that you cannot print a horizontal line with fully overlapping dots. Even with the skips, dots on the same row are close enough together that a line will appear solid. You can, however, print dots in other rows. This allows you to create much finer curves and diagonal lines in these high-density modes.*

2. Number of Columns

The "start graphics" code is followed by two numbers telling the printer how many columns to print. For ease of reference, call these numbers n1 and n2.

To find the value of these numbers, determine how many columns you want to print, then divide it by 256. The value of n2 is the integer portion of the quotient, and the value of n1 is the remainder expressed as an integer.

Example:

Suppose you want to print 400 columns of graphics:

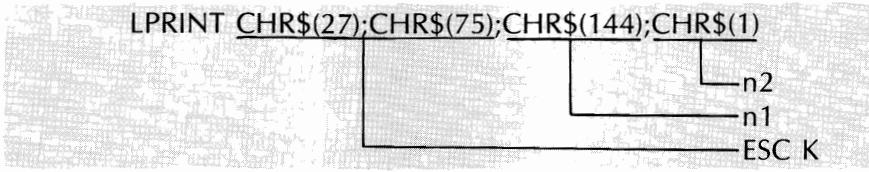
$$n2 = 1$$

$$256 \overline{)\ 400}$$

$$256$$

$$n1 = 144$$

If you want to print in single density graphics mode, the beginning of your statement should look like this:



IBM BASIC includes two functions that make calculating n1 and n2 very easy:

- MOD divides two numbers and returns the integer remainder,
- FIX removes the fractional portion of a numeric expression without rounding it off.

See your BASIC Manual for details.

Using these functions, you can express our sample numbers this way:

```
10 NDOTS=400
20 LPRINT CHR$(27);CHR$(75);CHR$(NDOTS MOD 256);
   CHR$(FIX(NDOTS/256))
```

IMPORTANT NOTE: *The number of dot columns expressed by n1 and n2 cannot be greater than the maximum number of dot columns per line allowed for the graphics mode you are using (see table below).*

Maximum Graphics Columns Per Line

Graphics mode	IBM-Compatible	
	ML182	ML183
ESC K (Single Density)	480	816
ESC L/ESC Y (Double Density)	960	1,632
ESC Z (Quadruple Density)	1,920	3,264

If the value entered is greater than the allowed maximum, the proper maximum value will automatically be entered.

3. Graphics Data

The last part of the graphics statement contains numeric data that tells the printer to print dots at specific positions in each column.

It is easiest to lay out your image on graph paper, filling in the squares where you want a dot to appear. (If you want to use higher-density graphics, keep in mind that the columns will overlap, and remember any restrictions that may apply.) Then divide the image into strips of eight rows. Each row will be programmed as a separate LPRINT statement.

Each position in the column has a numeric value as shown in the table below. Simply add the values of the column positions where you want dots to appear, then enter the total in your LPRINT statement.

IF YOU ARE FAMILIAR WITH BINARY NUMBERS: *Each column is represented by an 8-bit binary number. A dot represents a "1" and a space is "0"; the top dot is the MSB (most significant bit) and the bottom dot is the LSB (least significant bit). The bit positions are shown in the table for reference. You can use the ASCII code chart in Appendix D as a conversion table.*

Column Position Values

Column Position	Decimal Value	Bit
○	128	2^7
○	64	2^6
○	32	2^5
○	16	2^4
○	8	2^3
○	4	2^2
○	2	2^1
○	1	2^0

Example:

```
   64
   16
    8
    4
+   1
-----
Enter   93   as CHR$(93)
```

If we call the number for each column C1, etc., then the complete statement looks like this:

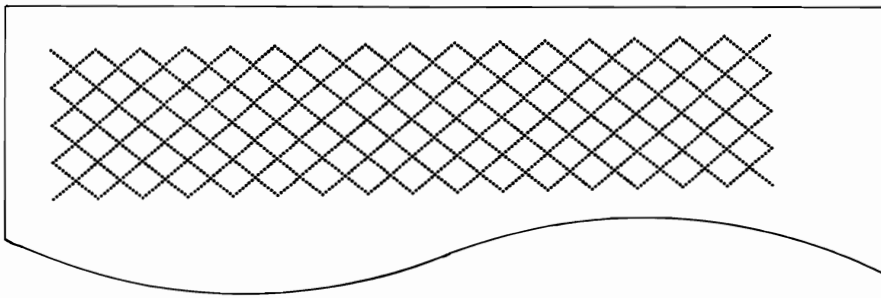
```
LPRINT CHR$(27);CHR$(75);CHR$(144);CHR$(1);CHR$(C1);
       CHR$(C2); ... ;CHR$(C400)
```

column data col. 1 ... col. 400

The format is the same for all density modes; the only differences are in the "start graphics" code and in the maximum amount of column data that can follow. The number representing any particular pattern of dots in a column is the same regardless of graphics mode.

Putting it Together

Now we can work through a simple example. Suppose we want to draw two diagonal lines. As drawn on graph paper, they look like this:



Step 1. Begin with LPRINT and the "start graphics" code for single-density graphics:

```
10 LPRINT CHR$(27);CHR$(75);
```

Step 2. Count the columns in the image. There are 11, so we calculate n1 and n2:

$$
\begin{array}{r}
n2 = \ 0 \\
256 \ \overline{)\ 11} \\
\underline{\ \ 0} \\
n1 = \ 11
\end{array}
$$

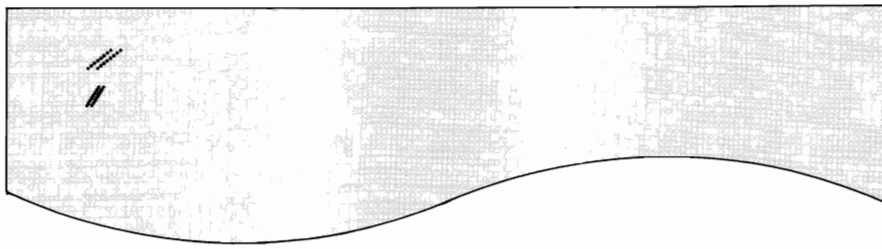
and add them to the statement:

```
10 LPRINT CHR$(27);CHR$(75);CHR$(11);CHR$(0);
```

Step 3. Next add the dot values for each column and insert them in the statement:

```
10 LPRINT CHR$(27);CHR$(75);CHR$(11);CHR$(0);CHR$(1);CHR$(2);
   CHR$(4);CHR$(9):CHR$(18);CHR$(36);CHR$(72);CHR$(144);CHR$(32);
   CHR$(64);CHR$(128)
```

Step 4. Now run the program. The result should look like this:

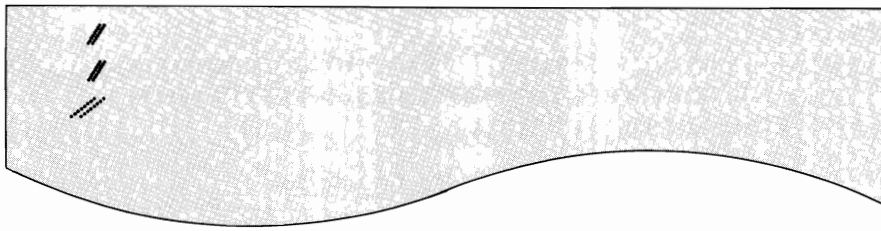


If it does not, check your arithmetic and typing, then try again.

Now go back and change the "start graphics" code to double density, half speed (ESC L):

```
20 LPRINT CHR$(27);CHR$(76);CHR$(11);CHR$(0);CHR$(1);CHR$(2);
   CHR$(4);CHR$(9);CHR$(18);CHR$(36);CHR$(72);CHR$(144);CHR$(32);
   CHR$(64);CHR$(128)
```

Run the program and compare:



Notice that the angle is steeper and the two lines are closer together. This is because each individual column now overlaps the next one. Notice also that it prints more slowly, although with this amount of printing the difference in speed may be hard to detect.

Now try double density, normal speed (ESC Y):

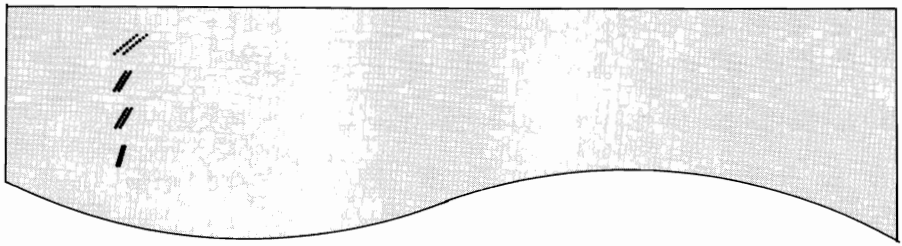
```
30 LPRINT CHR$(27);CHR$(89);CHR$(11);CHR$(0);CHR$(1);CHR$(2);
   CHR$(4);CHR$(9);CHR$(18);CHR$(36);CHR$(72);CHR$(144);CHR$(32);
   CHR$(64);CHR$(128)
```

Aside from printing speed, there should be no difference, because the pattern does not include adjacent dots; if it had, some dots would have been skipped.

Finally, try quadruple density (ESC Z):

```
40 LPRINT CHR$(27);CHR$(90);CHR$(11);CHR$(0);CHR$(1);CHR$(2);
   CHR$(4);CHR$(9);CHR$(18);CHR$(36);CHR$(72);CHR$(144);
   CHR$(32);CHR$(64);CHR$(128)
```

Compare the results:



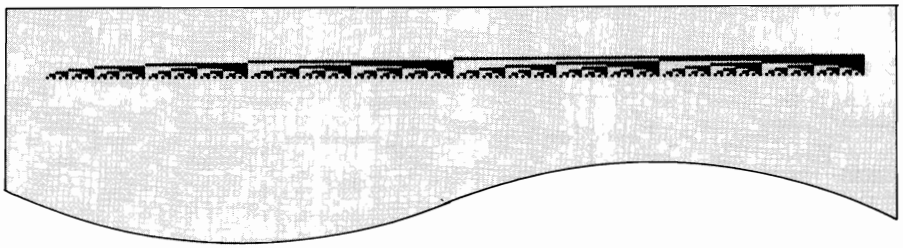
The angle is even steeper, and the two lines have merged into one thick line because of even greater overlap.

Here is another sample program that uses a FOR-NEXT loop to print all the possible combinations of dots and spaces in numeric order:

```
05 'SAMPLE2
06 WIDTH "LPT1:",255
10 NDOTS = 256
12 'MAXIMUM POSSIBLE COMBINATIONS
30 LPRINT CHR$(27);CHR$(75);
   CHR$(NDOTS MOD 256);CHR$(FIX(NDOTS/256));
40 'START GRAPHICS 256 COLUMNS
50 FOR I = 0 TO NDOTS-1
60 LPRINT CHR$(I);
70 NEXT I
73 LPRINT:REM LINE FEED
```

A word of explanation about line 06: *The IBM personal Computer is set for a maximum line length of 80 characters, so it adds a Carriage Return and Line Feed after the 80th character. Because the data for each column is treated as a character, your computer will send CR and LF codes after the data for the 80th column, and the printer will interpret these codes as graphics information and print them. A WIDTH statement changes the maximum length of a line, and placing the number 255 in a WIDTH statement eliminates any length restriction. (See your IBM BASIC Manual for details.)*

The printout looks like this:



You can vary the length of the graphics line by changing the value of NDOTS.

Try changing the density in this program and see what happens.

Save this program; you will need it later.

Combining Text and Graphics

You can mix normal text printing and graphics on the same line. Here is an example using the image coded in the last section:

```
05 'SAMPLE 3
10 LPRINT "TEXT PRINTING";CHR$(27);CHR$(75);CHR$(11);CHR$(0);
   CHR$(1);CHR$(2);CHR$(4);CHR$(9);CHR$(18);CHR$(36);CHR$(72);
   CHR$(144);CHR$(32);CHR$(64);CHR$(128);
   "TEXT PRINTING AGAIN"
```

Here is the result:

```
TEXT PRINTING /// TEXT PRINTING AGAIN
```

The printer prints normally until it receives the "start graphics" code. It then prints the number of graphics columns specified by n1 and n2 and automatically returns to normal printing.

NOTE: *Be careful to enter the amount of graphics data you told the printer to expect; otherwise the results will be garbled.*

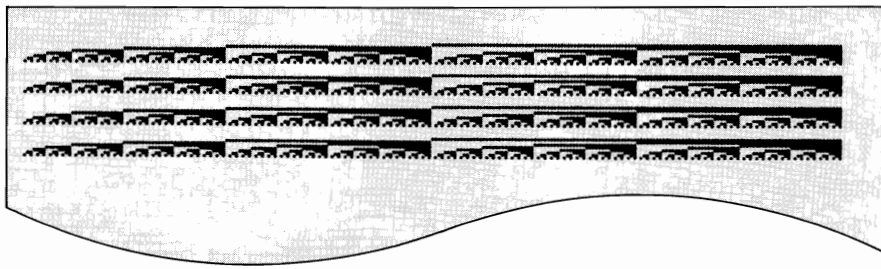
PRINTING MULTILINE GRAPHICS

One LPRINT statement cannot print more than one line of graphics, so you have to enter a separate LPRINT statement for each subsequent line of graphics.

To illustrate this, add these lines to the SAMPLE 2 program:

```
25 FOR J = 1 TO 4
75 NEXT J
```

This loop causes the LPRINT statement to be repeated four times. Here is the result:



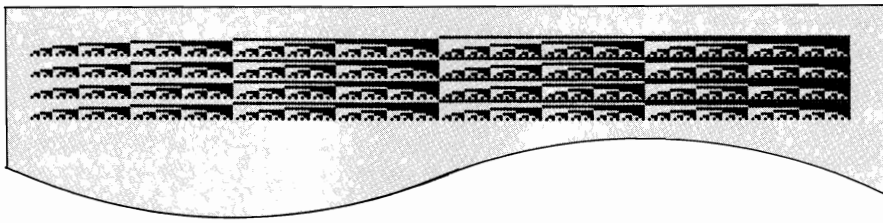
Notice that there is a space between each pair of lines. This is because the standard distance from the top of one line to the top of the next is 1/6 inch, but a column of graphics is only 1/9 inch high (8 dots × 1/72 inch per dot = 8/72 inch = 1/9 inch). To print a continuous image with no gaps between the lines, you must use the ESC A command to change line height to 8/72 inch and ESC 2 to activate the change (see page 47). Add these lines:

```
15 LPRINT CHR$(27);CHR$(65);CHR$(8)
18 LPRINT CHR$(27);CHR$(50)
```

The modified program now looks like this:

```
05 'SAMPLE2
06 WIDTH "LPT1:",255
10 NDOTS = 256
12 'MAXIMUM POSSIBLE COMBINATIONS
15 LPRINT CHR$(27);CHR$(65);CHR$(8)
18 LPRINT CHR$(27);CHR$(50)
25 FOR J = 1 TO 4
30 LPRINT CHR$(27);CHR$(75);CHR$(NDOTS MOD 256);
   CHR$(FIX (NDOTS/256));
40 'START GRAPHICS 256 COLUMNS
50 FOR I = 0 TO NDOTS-1
60 LPRINT CHR$(I);
70 NEXT I
73 LPRINT:REM LINE FEED
75 NEXT J
```

The result looks like this:



Reminders

1. Make sure you have entered column data for the same number of columns as specified by n1 and n2 in your LPRINT statement. If you enter too much or too little data, the results will be garbled.

2. You can print no more than the maximum number of columns for your graphics density mode (see table on page 61). If more data is contained in the LPRINT statement, the excess will simply be ignored.

3. Observe the limitations on dot placement in these graphics density modes:

Double density, normal speed (ESC Y) and quadruple density (ESC Z): *Skip at least one dot position between dots on the same horizontal row. The printer will not print a dot placed closer than this.*

Hints

The ways you can use features of BASIC to program graphics are limited only by your imagination and your programming experience. In this section we summarize the tricks used in the examples and suggest a few new ones.

MOD and FIX can be very helpful in calculating the number of columns of graphics data, as explained on page 64.

You can use the type of FOR-NEXT loop shown in sample 2 in some cases where the dot pattern can be described by a mathematical function; a straight line or a sine wave, for example.

To simplify typing the column data, you can enter the values in a DATA statement, then use a READ statement in a loop to print it. Here is a model:

```
    .
    .
    .
 30 LPRINT CHR$(27);CHR$(75);CHR$(NDOTS MOD 256);
    CHR$(FIX(NDOTS/256));
 40 FOR I=1 TO NDOTS
 50 READ C
 60 LPRINT CHR$(C);
 70 NEXT I
    .
    .
    .

100 DATA 2,4,8,16,32,.....
```

This method makes it easier to check and modify your data. Using a variable such as NDOTS helps to make sure the amount of data in the program matches the number of columns you have specified.

CANCEL FUNCTION

ASCII	Decimal	Hexadecimal
CAN	CHR$(24)	18

The cancel code clears the printer buffer. All control codes remain in effect until you give a specific command to change them or turn the printer off, with the exception of SO (double-width), which is cancelled.

LINE FEED

ASCII	Decimal	Hexadecimal
LF	10	0A
VT	11	0B

Execution of the VT or LF command causes one line of data to be printed, and also causes the paper to advance one line.

PAPER OUT

ASCII	Decimal	Hexadecimal
ESC 8	CHR$(27);CHR$(56);	1B 38
ESC 9	CHR$(27);CHR$(57);	1B 39

If you want to disable the paper out alarm (the paper indicator will not light when paper is low) enter the ESC 8 command. If you want to be signaled by the printer when paper is low or out, (this is the default setting) use the ESC 8 command.

NEAR LETTER QUALITY MODE

ASCII	Decimal	Hexadecimal
ESC I ETX	(27) (73) (3)	(1B) (49) (03)

When you want to make a good impression with a memorandum or letter, use OKI's special near letter quality mode. In this mode the printer prints over each line twice. On the second pass, the printer fills in the dot pattern to form a sharp, crisp letter. You get great results when you print your word-processing files in this mode.

UTILITY MODE

ASCII	Decimal	Hexadecimal
ESC I SOH	(27) (73) (1)	(1B) (49) (01)

The first time you turn your printer on, it will automatically print in utility mode. In this mode, the printer prints bidirectionally. This printing method increases the printer's speed, so it prints 120 characters per second.

APPENDIX A
Programming Commands

APPENDIX A IBM-COMPATIBLE ML182/183 PROGRAMMING COMMANDS

Description	ASCII	Decimal	Hexadecimal
CARRIAGE RETURN			
Prints data and returns print head to the left margin position.	CR	13	0D
HORIZONTAL TAB			
Tabs to next horizontal tab stop	HT	9	09
Cancels tabs	ESC D NUL	27 68 0	1B 44 00
CHARACTER SIZE			
10 CPI	DC2	18	12
12 CPI	ESC:	27 58	1B 3A
17.1 CPI	SI	15	0F
Double width	SO	14	0E
Turns off double width before end of line.	DC4	20	14
Turns double width on permanently.	ESC W 1	27 87 49	1B 57 31
Turns double width off permanently.	ESC W 0	27 87 48	1B 57 30
CLEAR BUFFER			
Resets normal width	CAN	24	18

Description	ASCII	Decimal	Hexadecimal
EMPHASIZED/ENHANCED PRINTING			
Doubles characters vertically (enhanced).	ESC G	27 71	1B 47
Doubles characters horizontally (emphasized).	ESC E	27 69	1B 45
Cancels emphasized printing.	ESC F	27 70	1B 46
Cancels enhanced printing.	ESC H	27 72	1B 48
FORMATING			
Specifies the length of a page.	ESC C n or ESC C 00 m	27 67 n 27 67 00 m	1B 43 n 1B 43 00 m
Skip over perforation; advances paper when less than 1 inch remains at bottom of page.	ESC Nn	27 78	1B 4E
Cancels skip over perforation.	ESC O	27 79	1B 4F

APPENDIX A PROGRAMMING COMMANDS

Description	ASCII	Decimal	Hexadecimal
GRAPHICS			
Prints data in single-density bit image graphics mode; 60 ×72 DPI.	ESC K	27 75	1B 4B
Prints data in half-speed, double-dinsity bit image graphics mode; 120×72 DPI.	ESC L	27 76	1B 4C
Prints data in normal-speed, double-density bit image graphics mode; 120×72 DPI.	ESC Y	27 89	1B 59
Prints data in quadruple-density bit image graphics mode; 240×72 DPI.	ESC Z	27 90	1B 5A
LINE FEED			
Advances paper one line.	LF	10	0A
Advances paper one line.	VT	11	0B
LINE SPACING			
Loads variable find line spacing.	ESC A n	27 65 n	1B 41 n
Sets line spacing to variable fine line spacing.	ESC 2	27 50	1B 32
Set the line feed to 7/72 inch	ESC 1	27 49	1B 31
8 LPI	ESC 0	27 48	1B 30
Sets the specified line space.	ESC 3 n	27 51 n	1B 35 n
Line spaces n/216 inch	ESC J n	27 74 n	1B 4A n

Description	ASCII	Decimal	Hexadecimal
PAPER OUT ALARM			
Paper indicator lights whenever paper is low or out.	ESC 9	27 57	1B 39
Printer will not respond to a paper out condition. Printer will continue printing even if paper is out.	ESC 8	27 56	1B 38
PRINT MODE			
NLQ mode	ESC I ETX	27 73 3	1B 49 03
UTILITY mode	ESC I SOH	27 73 1	1B 49 01
SUPERSCRIPTS AND SUBSCRIPTS			
Selects superscripts.	ESC S 0	27 83 48	1B 53 30
Cancels superscript and subscripts.	ESC T	27 84	1B 54
Selects subscripts.	ESC S 1	27 83 49	1B 53 31
UNDERLINING			
Begin underlining	ESC-1	27 45 49	1B 2D 31
Stop underlining	ESC-0	27 45 48	1B 2D 30

APPENDIX B
Software Notes

APPENDIX B Software Notes

This appendix explains how to use four popular software packages on the IBM Personal Computer. We've provided step-by-step instructions which demonstrate how to print files and how to activate your IBM Comatible MICROLINE printer's special features, as well as hints to help you make the most of your printer and software. These instructions are intended to supplement rather than replace those for your software package, therefore we strongly recommend that you review your software manual before trying to use your package with your MICROLINE printer. Your OKI dealer can also provide you with USERS TIPS, which we issue frequently in order to inform you about new software packages.

NOTE: *The I-PRIME signal sent by the IBM Personal Computer causes the printer to return to its default settings—Utility mode, 10 characters per inch, and six lines per inch. In most instances, your computer sends an I-PRIME signal when the software program is being loaded. Therefore, if you wish to use the printer's switch controls to select other available IBM-Compatible MICROLINE print features, you must use them after your software has been loaded. This prevents the I-PRIME signal from overriding your selections.* *See page 73 for an exception to this procedure in the case of VisiCalc.*

All print samples in this appendix have been reduced in size.

The symbol <CR> indicates a carriage return, which is entered by pressing the angled arrow key located on the IBM Personal Computer main keypad.

VisiCalc

Chapter 3 and Appendix A of the VisiCalc User's Manual explain how to print your spreadsheet. This section will clarify that information and give a few examples.

Use the SETUP option to send the control codes that specify the kind of printing you want. Because VisiCalc sends an I-PRIME signal to clear the printer before it prints, you can't use the buttons on the printer to select 17.1 cpi (condensed print) after you've booted your software. See Chapter 2 of this handbook. You can use the hexadecimal form of control codes. Each code number must be preceded by /\H: hold down the shift key and press the number 6 key, then press H. Here are your MICROLINE printer's features and the corresponding codes in hexadecimal form:

Emphasized Print	/\H1B/\H45
Enhanced Print	/\H1B/\H47
17.1 cpi	/\H0F
12 cpi	/\H1B/\H3A
10 cpi	Default Setting
8.5 cpi	/\H0F/\H1B/\H57/\H01
6 cpi	/\H1B/\H3A/\H1B/\H57/\H01
5 cpi	/\H12/\H1B/\H57/\H01
6 lpi	Default Setting
8 lpi	/\H1B/\H30

NOTE: *For other line spacing options, see ESC A, ESC 2, and ESC 3 on pages 41 and 42*

Printing The Spreadsheet

Our first example shows how to produce the printed spreadsheet in the normal print (Utility, 10 cpi, 6 lpi) mode.

Example 1: Normal printing

Keyboard Entry	**Screen Prompt**
/P	File,Printer
p	Print:Lower right,
	"Setup,-,&
G9<CR>	[Spreadsheet is printed]

Here's the result:

PERIOD	JAN	FEB	MARCH	APRIL	MAY	JUNE
INCOME	2200	2150	2325	2500	1800	2000
MORTGAGE	385	385	385	385	385	385
UTIL.	160.83	124.5	48.92	54.56	65.8	75.47
PHONE	21.5	19.75	15.75	18.82	14.62	13.57
FOOD	180	180	180	180	180	180
CLOTHING	120	120	120	120	120	120
HONDA	75.5	75.5	75.5	75.5	75.5	75.5

Notes:

The last step, G9, selects the portion of the VisiCalc worksheet to be printed. The position of the cursor (in this case the home position: column A, row 1) determines the upper left corner, and the coordinates entered during the printing procedure set the lower right corner. In our example, G9 defines the printed area as seven columns (A through G) by nine rows (1 through 9). You can vary the amount printed by changing either of the coordinates.

Changing Print Size

In our next example, we'll use the SETUP option to print the spreadsheet in condensed type. This type size is especially useful with VisiCalc because it enables you to fit more columns on the same page. Before you start, check the position of the cursor (in this example, it should be in the home position).

Example 2: Condensed Print

Keyboard Entry	Screen Prompt
/p	File, printer
p	Print: Lower right,
	"Setup,-,&
"	Setup or ENTER
/\H0F<CR>	Print: Lower right,
	"Setup,-,&
M9<CR>	[Spreadsheet is printed in condensed type]

Here's the result:

PERIOD	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
INCOME	2200	2150	2325	2500	1800	2000	2200	2200	2375	2400	2100	1900
MORTGAGE	385	385	385	385	385	385	385	385	385	385	385	385
UTIL.	160.83	124.5	48.92	54.56	65.8	75.47	78.29	88.81	49.84	87.3	92	109.26
PHONE	21.5	19.75	15.75	18.82	14.62	13.57	18.93	18.92	18.02	12.92	18.38	34.94
FOOD	180	180	180	180	180	180	180	180	180	180	180	180
CLOTHING	120	120	120	120	120	120	120	120	120	120	120	120
HONDA	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5

Notes:

Entering " allows you to insert control codes that will be sent to the printer. 0F, preceded by H, is the hexadecimal code that programs the printer to change to condensed type. Because condensed printing fits more characters on a line, we can change the lower right coordinates so that 13 columns are printed. With condensed printing, this will still fit on standard 8-1/2" width paper.

Multiple Control Codes

You can use the SETUP option to send more than one code to the printer. This means that you can specify those printing features that require more than one code, such as double-width printing, and you can combine features like printing in condensed type at 8 lines per inch. Each individual code number must be preceded by ^H.

In this example, we're going to print at 8.5 cpi and 8 lines per inch.

Notes:

This kind of printing requires three sets of control codes: the code sequence for condensed print (17.1 cpi), the sequence to double the width to 8.5 cpi, and the code sequence for eight lines per inch. We've printed them on separate lines in our example so that you can more easily see what's going on, but you should type them in a string, and then press the ENTER key.

Example 3: Multiple Control Codes

Keyboard Entry	Screen Prompt
/P	File, Printer
p	Print: Lower right,
	"Setup,-,&
"	Setup or ENTER
^H0F	
^H1B^H57	
^H01	
^H1B^H30	<CR> Print: Lower right,
	"Setup,-,&
G9 <CR>	[Spreadsheet prints at 8.5 cpi,
	8 lpi]

Here's the result:

PERIOD	JAN	FEB	MARCH	APRIL	MAY	JUNE
INCOME	2200	2150	2325	2500	1800	2000
MORTGAGE	385	385	385	385	385	385
UTIL.	160.83	124.5	48.92	54.56	65.8	75.47
PHONE	21.5	19.75	15.75	18.82	14.62	13.57
FOOD	180	180	180	180	180	180
CLOTHING	120	120	120	120	120	120
HONDA	75.5	75.5	75.5	75.5	75.5	75.5

Printing Titles

You can use the SETUP option to print one or more lines of text above the spreadsheet. In this example, we'll print the title "BUDGET" in double-width (5 cpi) and underline, then print the spreadsheet in condensed type. Check the position of the cursor before you start (home position).

Example 4: Printing Title and Condensed Type

Keyboard Entry	Screen Prompf
/p	File, printer
p	Print Lower right,
	"Setup,-,&
"	Setup or ENTER
^H0E^H1B	
^H2D^H01	
BUDGET^H1B	
^H2D^H10	Print Lower Right,
^R^R	<CR> "Setup,-,&
"	Setup or ENTER
^H0F <CR>	Print Lower Right,
	"Setup,-,&
M9 <CR>	[Title & Spreadsheet are printed]

Here's the result:

BUDGET

PERIOD	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
INCOME	2200	2150	2325	2500	1800	2000	2200	2200	2375	2400	2100	1900
MORTGAGE	385	385	385	385	385	385	385	385	385	385	385	385
UTIL.	160.83	124.5	48.92	54.56	65.8	75.47	78.29	88.81	49.84	87.3	92	109.26
PHONE	21.5	19.75	15.75	18.82	14.62	13.57	18.93	18.92	18.02	12.92	18.38	34.94
FOOD	180	180	180	180	180	180	180	180	180	180	180	180
CLOTHING	120	120	120	120	120	120	120	120	120	120	120	120
HONDA	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5	75.5

Notes:

^H0E activates double-width printing (in this case 5 cpi). ^H1B^H2D^H01 starts underlining. At the end of the word "BUDGET," the codes ^H1B^H2D^H00 stop underlining. (Be sure to turn off a feature like underlining; you wouldn't want to underline an entire spreadsheet but there's no reason not to use it in a heading.) Double-width printing using ^H0E is automatically cancelled at the end of a line, so you don't need a special code to stop it (see page **45** of this manual). ^R reads a carriage return. (See Appendix A of the VisiCalc manual for details.)

SuperCalc[3]

The following information addresses the Sorcim SuperCalc[3] (Rev. 2.0) program and its use in conjuction with your MICROILINE printer. This assistance should enable you to more easily print spread sheets and graphs. Spread sheets printed in 10 cpi and 17.1 cpi, as well as both pie and bar charts printed in single and quad density are discussed.

Prior to using SuperCalc, the master SuperCalc disk must be copied onto a working disk. The master disk should be stored in a safe place once you have copied it onto a working disk. Only the working disk copy of SuperCalc should be used.

Using SuperCalc[3] To Create Spreadsheets

Figure 1 depicts a typical spreadsheet, though it contains fictional data. Enter data in your spreadsheet as depicted in the fictional data shown in figure 1. The examples that follow explain how to implement 10 cpi and 17.1 cpi SuperCalc printouts. Type only what is underlined in the examples.

```
     |   A   ||   B   ||   C   ||   D   ||   E   ||   F   ||   G   ||   H   |
1                        Applied Wigets Inc.
2                        1984 Gross Sales
3
4    Model          1st Qrt   2nd Qrt   3rd Qrt   4th Qrt   Total
5    3120-00            124       100        75        65       364
6    3120-01            110       115       120       117       462
7    3120-02             90       110       135       120       455
8    3120-03              0        25        78       134       237
9
10   Total )            324       350       408       436      1518
11
12
13
14
15
16
17
18
19
20
B2
Width:  9  Memory:293 Last Col/Row:F10      ? for HELP
  1)
F1 = Help; F2 = Cancel; F9 = Plot; F10 = View
```

FIGURE 1 A Typical Spreadsheet

Using SuperCalc^3 in the 10 cpi Utility Mode

To initiate a 10 cpi, Utility Mode printout, enter the following; remember to type in only what is underlined.

/Output, Display, A1:F10, Printer

The printout that results is depicted in figure 2.

	A	B	C	D	E	F
1			Applied Wigets Inc.			
2			1984 Gross Sales			
3						
4	Model	1st Qrt	2nd Qrt	3rd Qrt	4th Qrt	Total
5	3120-00	124	100	75	65	364
6	3120-01	110	115	120	117	462
7	3120-02	90	110	135	120	455
8	3120-03	0	25	78	134	237
9						
10	Total >	324	350	408	436	1518

FIGURE 2 Utility Mode

Using SuperCalc^3 in the 17.1 cpi Utility Mode

Implementing the 17.1 cpi Utility Mode is slightly more involved, but this mode enables you to fit more columns across a single page. The IBM-Compatible ML182/183 permits you to print up to 132/233 characters across the width of the paper in 17.1 cpi. Type in the following underlined entries.

/Output, Display, A1:F10, Setup

The following display will appear on your screen.

```
L = Length of page [0 = continuous form]
    (now 66 lines)
W = Width of page
    (now 132 chars)
N = New border character
    (now 1)
B = toggle border
    (now matches display)
A = toggle Auto-form-feed
    (now OFF)
D = toggle Double space
    (now OFF)
E = Toggle End-line-feed
    (now ON)
S = Set printer control codes

Current control codes are:

R = Retain printer control codes for session
P = Print report

A1
Length,Width,New,Border,Auto FF,Double Space,End LF,
Set,Retain,or Print?

30>/Output,Display,a1:f10,Setup,
f1 = Help; F2 = Cancel; F9 = Plot; F10 = View
```

Type:

S for the manual set-up mode.

The system will respond with:

```
Current Control Codes are:
```

Type:

^O <CR>

^O is the alpha character "O" and the Cntl key pressed simultaneously.

Then, select P to print. The condensed mode printout initiated by this procedure is depicted in Figure 3.

	A	B	C	D	E	F
1			Applied Wigets Inc.			
2			1984 Gross Sales			
3						
4	Model	1st Qrt	2nd Qrt	3rd Qrt	4th Qrt	Total
5	3120-00	124	100	75	65	364
6	3120-01	110	115	120	117	462
7	3120-02	90	110	135	120	455
8	3120-03	0	25	78	134	237
9						
10	Total)	324	350	408	436	1518

FIGURE 3 Condensed Mode

Manual Control Codes Available in Set-Up Mode

The chart below is a quick reference of the control codes which must be typed in the manual set-up mode.

FEATURE	IBM-Compatible ML182/183 ON/OFF
5 cpi	ESC W1/ESC WO*
6 cpi	ESC : ESC W1/ESC WO Cntl R
8.5 cpi	ESC W1 Cntl O/ESC WO Cntl R*
10 cpi	Default
12 cpi	ESC : /Cntl R
17.1 cpi	Cntl O/Cntl R*
6 lpi	ESC 2
8 lpi	ESC 0

*The first set of control codes implements the feature; the second set of control codes cancels the feature.

Cntl represents the control key implemented in conjunction with the indicated key.

Using SuperCalc³ To Create Graphs

SuperCalc³ does not require the user to place data that is to be depicted in graphic form in any special location. All you need to do is direct the SuperCalc³ program to the location where the data can be found. Consult your SuperCalc³ manual for instructions on using its graphing features. Please read this section before going further.

Setting Up Your Graph

In the instructions which follow, type the underlined text.

1. From the command line, type /V. SuperCalc³ will display the graph options available to you.
2. Type:

   D for Data, then when prompted, type:
   B5:E8
   This loads the location of the data. Enter a return <CR> to send control back to the /view command line.
3. Type:

   H for heading, then M for Main Heading.
   Enter C1 for the range.

   Repeat the above for S(Sub) headings and enter C2.

   Enter two returns <CR> to send control back to the /view command line.
4. Type:

   V for Var labels

   Enter the range A5:A8. Enter a return <CR> to display the graphic command line.

   Type:

   T for time labels and enter the range B4:E4 as the data for the time headings. Enter a return <CR> to send control back to the /view command line.

5. Type:

   G for graph type and setup
   P for pie

   Exit by pressing the return key <CR>. (You may need to press the return key twice on some machines.

   To view or see the chart from the main spread sheet, press the F10 key.

   Press the return key <CR> to return to the spread sheet.

Printing Your Graph

1. Type /G for global
   Type G for graphics
   Type O for options

   Use the cursor keys and select the options as shown in Figure 4. When you are finished, press the function key F2 to return control to the Global graphics command bar.

```
    OPTIONS MENU: GRAPH APPEARANCE & DEVICE SETTINGS  [F2 for spreadsheet]
    For all graphs except Pie:          Plotter Interface:
    Grids              N                Use              P
    Axes               Y
    Ticks              Y                Parallel Options:
    Graph Box          N                Printer number    1

    For Pie, Bar and Stacked-Bar:       Serial Options:
    Fill Type          C                Com number        1
                                        Baud Rate      4800
    For Line, Hi-Lo, Area and X-Y:      Parity            N
    Point Markers      Y                Data bits         8
    Lines              Y                Stop bits         1

    Color Monitor:                      Two monitors:
    Display            B                Dual Display      N
                                        Regraph           A
    Graphics Printers:
    Resolution         S

    Pen Plotters:
    Num. pens          1
Y(es) or N(o)?
 25)/Global,Graphics,Options
F1 = Help: F2 = Cancel: F9 = Plot: F10 = View
```

FIGURE 4

2. Type D for Device

   Using the cursor keys and the return key, select IBM Graphic Printer on the main menu.

Press function key F2 to return control to the global graphic command line. Press the return key <CR> to return control to the spread sheet.

3. Press function key F0 to plot your pie chart. To initiate printout of the pie chart, press the function key F9. The resultant printout is depicted in figure 5.

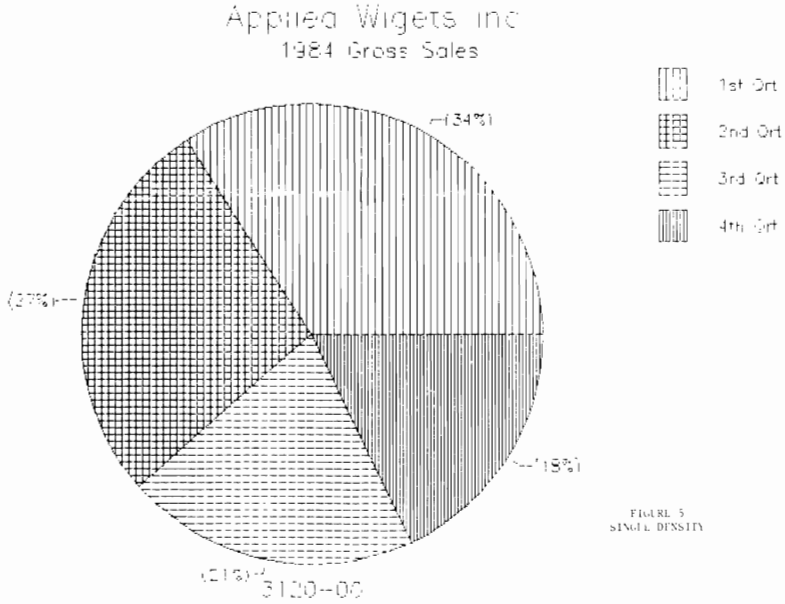


FIGURE 5

Figure 6 is a depiction of the same pie chart; however, a quad resolution was selected from the option menu.

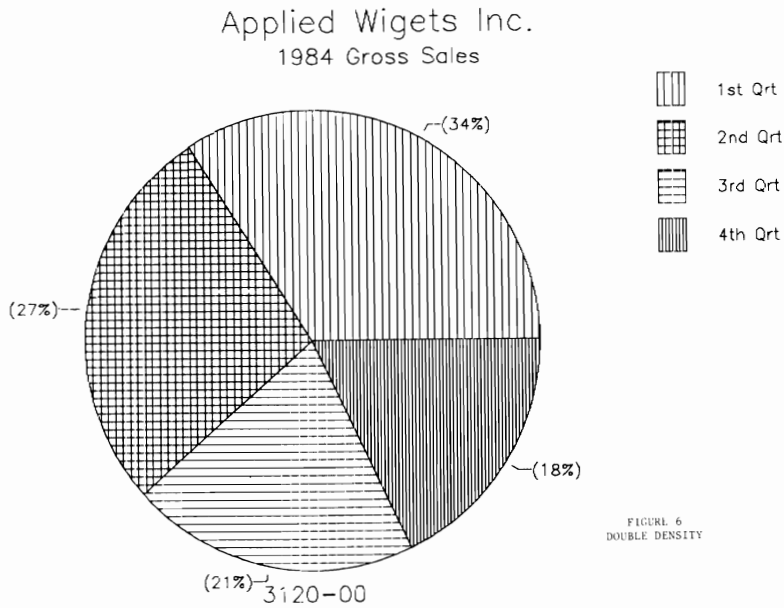


FIGURE 6

Figures 7 and 8 are bar charts which were generated from the same data.

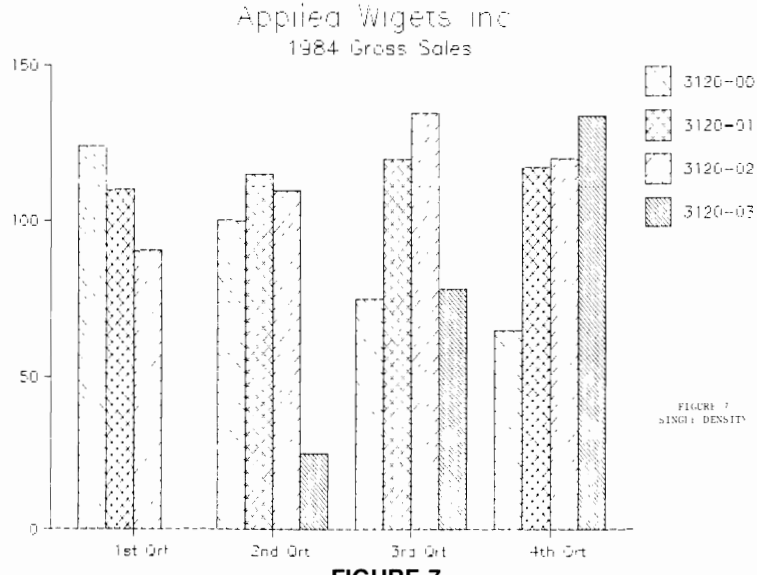


FIGURE 7

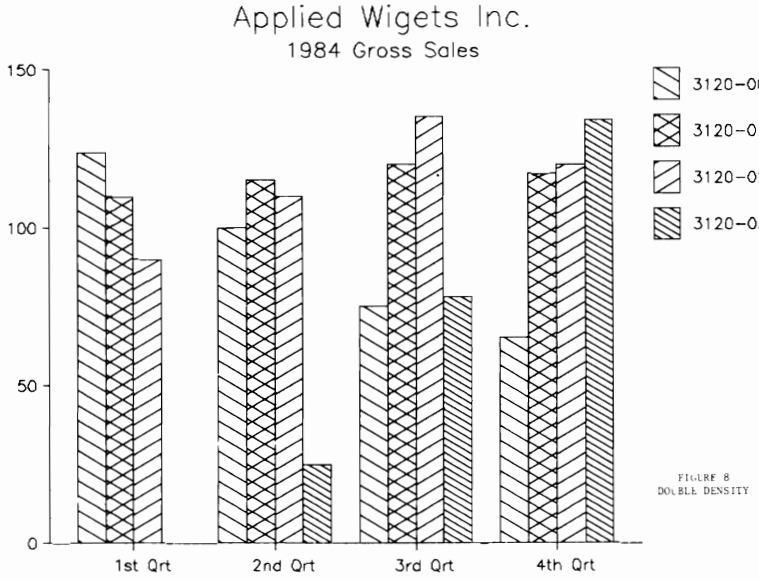


FIGURE 8

The best way to learn to use SuperCalc³ is to experiment. You should therefore experiment on your own until you find the combination of options most suitable to your needs.

Special Notes About SuperCalc³

1. While SuperCalc³ is plotting graphic data, there may be times when the printer stops for as long as one minute. While this is more likely to occur when plotting triple or quad density graphics, this is normal and occurs while SuperCalc³ is performing calculations.
2. The size of the chart may also be changed with the global/graphics/layout command. This command will allow the user to alter:

   Paper size
   Graph Layout (Horizontal or Vertical)
   Scale
   Margins

WordStar

The WordStar word processing package has an installation program which configures WordStar to run with the equipment you're using. Part of this program enables you to put printer codes for special features into the software. This is called "patching." The patching feature enables you to control printing features by placing WordStar control characters in your text file. In this section, we'll show you how to set up WordStar for the IBM-Compatible ML182/183 and give you some hints about using printing features.

The number of features you can patch into WordStar is limited, so it's a good idea to spend a few minutes thinking about what you'll need for the kind of documents you want to write. You may need superscripts and subscripts, for example, but not different character widths. Our sample configuration will have the following MICROLINE features:

10 Characters Per Inch (Pica) printing
17.1 cpi (condensed) printing
Double-width printing (5/8.5 cpi)
Continuous Underlining
Superscripts and Subscripts
6 lines per inch
8 lines per inch

Of course, this is just one possible combination.

Before you start, make a copy of WordStar and use the copy for patching. Save the original in case you have difficulty patching. You may also want to patch several versions with various combinations of features for different uses.

How to Patch WordStar, Version 3.30

Your WordStar Installation Manual explains how to use the WINSTALL program. You will need to select the following items from the appropriate menus:

Terminal:	IBM Personal Computer
Communications Protocol:	No protocol
Driver:	Parallel printer driver

The rest of this section describes how to make the proper selections from the PRINTER INSTALLATION MENU for your IBM-compatible MICROLINE printer's special features.

WordStar 3.30 is patched from the PRINTER INSTALLATION MENU of the WINSTALL program. You get to this menu from the main INSTALLATION MENU. From the main menu, type D<CR>. The screen will display the PRINTER INSTALLATION MENU, which looks like this:

```
      *****   PRINTER INSTALLATION MENU   *****

A  Automatic installation for Specialty printers
B  Automatic installation for Standard printers

All printers                          Specialty printers only

C  Printer name                       I  Ribbon selection
D  Initialization                     J  Vertical motion
E  Overprinting                       K  Horizontal motion
F  Boldfacing                         L  Print modes
G  Protocol menu                      M  Phantom characters
H  Driver menu

Standard printers only                Optional

N  Return / line feed                 O  User-defined functions
                                      P  Carriage roll
                                      Q  Character pitch
X  Exit to INSTALLATION menu

   Enter the letter of your choice (A-Q/X).
```

Now type C.

Type C again, then enter the name of your printer. This will be the name WordStar uses in any messages concerning the printer you've installed. You can use up to 34 characters to name your printer. You could, for example, name your printer "OKI MICROLINE", or you could name your printer something more personal, such as "Splendid," Then press <CR> and the screen will show your entry and ask you to verify it. If it's correct, simply press <CR>; if you wish to change it, press N.

Selections "I," "O," "P," and "Q" in the Printer Installation Menu will be used in our examples to install your OKI MICROLINE printer features into patch locations which correspond to the assigned functions found in the Control P Menu of WordStar.

After the insertion of each patch, WINSTALL will request verification of the code sequence. If it was entered correctly, all you need to do is press <CR> and continue. However, if an error was made, you must press the N key to reenter the data.

WINSTALL allows the patch codes to be entered in three different formats—ASCII, hexadecimal, and decimal. To enter a code in ASCII, type a colon followed by one character of the code. Hexadecimal codes may be preceded by a comma or entered directly. Thus, ESC may be typed as ,1B or simply 1B. Decimal codes must be preceded by the pound sign (#). ESC would be typed as #27. Hexadecimal is easiest, so we'll use that format.

Each patch code must be entered one character at a time and you must press <CR> after each character. To terminate an entry, you must enter a period after the last code—provided that the maximum number of entries has not been exceeded.

We'll step you through our sample patch, taking each menu in turn. We suggest that you try this patch so you can see how it works, then make any modifications for your own requirements.

MENU ITEM Q: CHARACTER PITCH This item is intended for changing character width. We're going to use it to set the printer to print in the emphasized print mode. Begin by entering Q. The screen will display this:

```
        Set alternate character pitch

If your printer allows, you can change the character pitch
within a document. This sequence specifies the characters
required to set alternate character pitch. Check your printer
manual for code sequence. What sequence of characters should
be sent to the printer at "^PA" in your text?

Set alternate character pitch function code sequence is
    currently : 1Bh 3Ah


Enter "C" to change,
or press (RETURN) to leave unchanged.
```

Type C. The following display will appear:

```
You can enter a value in ASCII, decimal, or hexadecimal
codes. Precede each entry with these prefixes:

ASCII          :     (:^A enters ASCII ^A, a single value)
Hexadecimal    ,     (,41 enters hexadecimal 41)
Decimal        #     (#61 enters decimal 61)

To enter a sequence of characters, enter each one separately,
followed by (RETURN).

Press (RETURN) to leave a value unchanged.
Enter a period (.) and press (RETURN) to terminate a sequence
    and to eliminate all subsequent values.

These special characters require hexadecimal input:
(RETURN) (^M)              ,0D
Period (.)                 ,2E
^H (backspace: ^H)         ,08

Maximum entries for set alternate character pitch function is 4.

Current      New
Value        Value
00h
```

(This display will appear on the screen each time you're expected to enter control codes.)

Enter the following code sequence:

```
1B  <CR>
45  <CR>
    <CR>
```

Next you'll be asked for the code for standard character pitch—in this case, for returning to Utility printing. Enter this code sequence:

```
1B  <CR>
46  <CR>
    <CR>
```

MENU ITEM I: RIBBON SELECTION
This selection is designed for printers that can use two-color ribbon, but we're going to use it for continuous underlining.

Type I. This will appear on your screen:

```
            Alternate ribbon selection

With this control sequence you specify alternate ribbon
selection, if your printer allows. What sequence of characters
should be sent to the printer at the first "^PY" in your text?

Alternate ribbon selection function code sequence is
    currently :  (empty)


Enter "C" to change,
or press (RETURN) to leave unchanged.
```

Type C and enter the control codes for underlining:

```
1B  <CR>
2D  <CR>
01  <CR>
    <CR>
```

Because ribbon selection happens to be a toggle, the same keys turn the feature on and off (example: "^PY underline ^PY stopped" would give you this: "underline stopped"), *you must enter the code to turn off the command.*

Type C, then enter the following code sequence to turn off the continuous underlining:

```
1B  <CR>
2D  <CR>
00  <CR>
    <CR>
```

MENU ITEM O: USER DEFINED FUNCTIONS

This selection lets you set WordStar commands to make any four feature changes. Keep in mind that for each feature you want to use, you'll need to add a command to turn it off. We're going to use one command for Condensed print (17.1 cpi), one for Double-width printing, one to stop both of these features (i.e., return to 10 cpi printing), and one to stop superscripts or subscripts. (See Chart on pages 77 to 80.)

Type C. Then enter the code sequence to start condensed printing:

```
0F  <CR>
 .  <CR>
```

Type C. Then enter the code for double-width printing:

```
1B  <CR>
57  <CR>
01  <CR>
 .  <CR>
```

Type C. Then enter the codes to cancel double-width and condensed printing:

```
1B  <CR>
57  <CR>
00  <CR>
12  <CR>
```

Finally, type C again and enter the code to cancel subscripts and superscripts:

```
1B  <CR>
54  <CR>
 .  <CR>
```

MENU ITEM P: CARRIAGE ROLL

This section is for superscripts and subscripts. It's an unusual type of toggle, which assumes that the command for subscripts cancels superscripts and vice versa. Your MICROLINE Printer, however, doesn't work that way: superscript and subscript commands function independently, and both are cancelled by the same command. (See page 48 for details.) We've already patched the command to stop superscripts and subscripts in Menu Item O; now we'll patch the command to start these features in the normal way. The note at the end of this section explains how to use these features.

Type P. When the display appears, type C, then enter the code for superscript printing:

```
1B  <CR>
53  <CR>
00  <CR>
 .  <CR>
```

When the display changes, type C, then enter the code for subscript printing:

```
1B  <CR>
53  <CR>
01  <CR>
 .  <CR>
```

Using Superscripts and Subscripts

Normally, typing ^PT starts superscript printing and a second ^PT stops it; the same applies to the use of ^PV to control subscripts. When you use this patch, however, be sure to add ^PR after the second ^PT or ^PV. For example:

Text in your WordStar file:

Superscripts for footnotes ^PT1^PT^PR,
Subscripts H^PV2^PV^PRSO^PV4^PV^PR.

Printed results:

Superscripts for footnotes[1]
Subscripts H_2SO_4.

INITIALIZATION
Printer menu selection D allows you to define any combination of print features that will be set before a WordStar file is printed. The selection of features you choose to define is known as the default print format. This has two uses. First, it ensures that any print features you'd used to print previous files have been cancelled; second, it lets you pick a particular kind of printing as the standard for all your documents—Condensed print, for example. Of course you can change these features within the WordStar file if you wish.

In our sample, we're going to set WordStar to initialize at the normal default settings: utility mode printing, 10 cpi character width, and 6 lines per inch line spacing.

Type D to start and you'll see the following display:

```
                    Printer initialization

This is the sequence transmitted to the printer at the start
of printing.

Printer initialization function code sequence is currently : Dh


    Enter "C" to change,
    or press (RETURN) to leave unchanged.
```

Enter "C" to change and you'll see the following display:

```
You can enter a value in ASCII, decimal, or hexadecimal
codes. Precede each entry with these prefixes:

ASCII          :     (:^A enters ASCII ^A, a single value)
Hexadecimal    ,     (,41 enters hexadecimal 41)
Decimal        #     (#61 enters decimal 61)

To enter a sequence of characters, enter each one separately,
followed by (RETURN).

Press (RETURN) to leave a value unchanged.
Enter a period (.) and press (RETURN) to terminate a sequence
    and to eliminate all subsequent values.

These special characters require hexadecimal input:
(RETURN) (^M)              ,0D
Period (.)                 ,2E
^H (backspace: ^H)         ,08

Maximum entries for printer initialization function is 16.

Current      New
Value        Value
0Dh
```

Now enter the code sequences to establish the default print format. You can enter a maximum of 16 codes:

<CR>		—Clear buffer (0D value remains unchanged)
1B	<CR>	
57	<CR>	Cancel Double-width
00	<CR>	
12	<CR>	—10 cpi
1B	<CR>	Cancel Superscripts/Subscripts
54	<CR>	
1B	<CR>	
46	<CR>	Utility printing
00	<CR>	
.	<CR>	—End of entry

After entering initialization string, WordStar asks for the Deinitialization string. Enter the same values in the Deinitialization string as you did for the initialization string. Do not enter the <CR> to clear buffer as you did in the initialization string.

Completing Installation

When you've finished making the installation selections for your printer, type *X* to exit the printer installation menu. The display will show your installation choices. If they're correct, type *A*; the changes will be saved and you will be returned to the main menu. Check the addendum to your WordStar manual ("Addendum of Special Considerations") for specific information on WordStar for the IBM Personal Computer; this includes an explanation of how to use the Function keys on your keyboard.

Printer Patch Table for WordStar Version 3.30

Feature	Function	Selection Keys		Coding
Emphasized Print	Alternate pitch	Q	^PA	1B,45
Continuous Underline (on)	Other ribbon color	I	^PY	1B,2D,01
Continuous Underline (off)	Other ribbon color	I	^PY	1B,2D,00
Condensed print (17.1 cpi)	User Patch Q(1)	O	^PQ	0F
Double width print	User Patch W(2)	O	^PW	1B,57,01
10 cpi (cancel condensed/ double-width print)	User Patch E(3)	O	^PE	1B,57,00, 12
Cancel Super/ Subscript	User Patch R(4)	O	^PR	1B,54
Start Superscript	Carriage Roll	P	^PT	1B,53,00
Start Subscript	Carriage Roll	P	^PV	1B,53,01
Utility Print	Standard pitch	Q	^PN	1B,46

Examples

The following examples show test WordStar files and the resulting printouts. They illustrate the features patched in the preceding procedures. These examples apply to all versions of WordStar.

```
This WordStar file will test the features in our sample
patch.  Right now the printer is in Utility mode, which
is  good for rough drafts and situations where printing
speed is important.

^W
This  prints  in ^Ydouble width^Y (5  CPI).  Anything  that
doesn't  fit  prints  on the next  line  -- which  also
throws  off the page length.^E Now we're back to 10  CPI.
See the next example for how to correct this.

^Q
This  is being printed in condensed type.  The  printer
automatically switches to Utility mode until  condensed
print is cancelled.

^W
When  the  double  width  code  is  combined  with  the
condensed  print code,  the result is 8.5 CPI.^E Back  to
normal size.

Pica, ^Wdouble width, ^Qdouble condensed, ^E^Q and condensed.
```

EXAMPLE 1 File

This WordStar file will test the features in our sample patch. Right now the printer is in Utility mode, which is good for rough drafts and situations where printing speed is important.

This prints in double width (5 CPI). Anything that doesn't fit prints on the next line -- which also throws off the page length.
Now we're back to 10 CPI. See the next example for how to correct this.

This is being printed in condensed type. The printer automatically switches to Utility mode until condensed print is cancelled.

When the double width code is combined with the condensed print code, the result is 8.5 CPI. Back to normal size.

Pica, double width, double condensed, and condensed.

EXAMPLE 1 Printout

Wordstar sets margins by column spaces -- the default is an eight-space left margin.
^Q
When you change character size, the width of a space changes too, and so does your margin.
^E
To adjust for this first add .Po 0 to your file to cancel the automatic left margin.
.po 0
Then use ^OL and ^OR to reset margins

The CPI value of each size tells you the number of characters per inch. Use this to calculate how many spaces for the desired left margin and how many characters for the desired line width. For Pica, we've used a left margin (^OL) of 10 and a right margin (^OR) of 70.

^W
In double width, left margin is
5 and right margin is 35.

^E^Q

In condensed printing, the left margin is 17 and the right margin is 119. All of these -- set using ^OL and ^OR -- give a left margin of approximately one inch, and a line width of approximately six inches.
^W

This is double condensed printing, using a left margin of 9 and a right margin of 60.
^E

EXAMPLE 2 File

Wordstar sets margins by column spaces -- the default is an eight-space left margin.

When you change character size, the width of a space changes too, and so does your margin.

To adjust for this first add .Po 0 to your file to cancel the automatic left margin.
Then use ^OL and ^OR to reset margins
The CPI value of each size tells you the number of characters per inch. Use this to calculate how many spaces for the desired left margin and how many characters for the desired line width. For Pica, we've used a left margin (^OL) of 10 and a right margin (^OR) of 70.

In double width, left margin is 5 and right margin is 35.

In condensed printing, the left margin is 17 and the right margin is 119. All of these -- set using ^OL and ^OR -- give a left margin of approximately one inch, and a line width of approximately six inches.

This is double condensed printing, using a left margin of 9 and a right margin of 60.

EXAMPLE 2 Printout

SuperWriter

While this portion of the IBM-Compatible ML182/183 user's manual is designed to assist you in your use of SuperWriter and your printer, it is not designed to replace the Super Writer manual. You should familiarize yourself with your SuperWriter manual, paying particiular attention to the sections that address installation, formatting, and printing.

Installation Of SuperWriter

Make a backup copy of SuperWriter and store your master copy in a safe place. Insert your backup copy in drive A of your system, and follow the steps below to install Super-Writer. The underlined text represents your entries.

>A INSW <CR>

This program provides SuperWriter with data about your printer.

Do you wish to proceed? (Y/N) Y

Enter d:filename: A:SW.COM where "A" is the drive number.

Printers supported

A - .....
C - .....
I - IBM
N - .....
O - OKIDATA
Q - .....
Z - DRAFT
X - Save or exit

Enter your choice or X I

Choose the "I" (IBM) selection. When you select this option, you will be provided with a list of specific IBM printers from which to choose. Select the IBM Graphics printer, and store this selection on your disk. You will be returned to the operating system once you have saved this file. Now you can use SuperWriter.

A summary of IBM-Compatible ML182/183 features that are available with SuperWriter is provided in the following chart.

Character Pitch	Character Sets	Special Features
10 cpi	CS1	Underlining
12 cpi	CS2	Bold
17.1 cpi	——	Subscripts
5 cpi	——	Superscripts
6 cpi	——	——
8.5 cpi	——	——

Because SuperWriter's documentation is clear and the package is easy to use, we won't go into detail explaining how to use SuperWriter. Instead, we've included print samples and the SuperWriter text files used to generate them. Some notes on the operation of SuperWriter are contained in these examples. If you copy these examples and experiment with them, this will help you discover the full capabilities of your equipment.

NOTE: *SuperWriter does not support proportional spacing on any dot matrix printer.*

The IBM extended character set can be implemented by pressing the ALT key in conjunction with the corresponding three digit decimal code. For example, to get the square root sign, press and hold down the ALT key, and type 251.

The file that follows was used to generate the sample text for the IBM-Compatible ML182/183. The backslash (/) that appears within the sample text is the slash command. Underlined characters are created by pressing the Ctrl and the P key, followed by the character keys you wish to print underlined. For example, OKIDATA was created by pressing Ctrl, P, and then typing OKIDATA. Pressing the Ctrl and the P key a second time turns off the underline command.

<CR> represents the return key.

This user tip will describe how to use the /\UOKIDATA/\U ML182-I and Sorcim's SuperWriter Ver. 1.03. This paragraph is being printed in 10 cpi.<CR>
<CR>
<CR>
\cpi 17.1\<CR>
This paragraph is being printed at 17.1 cpi. Note that the left and right margins do not have to be reset if the character pitch is changed. In fact, it is possible to change the character pitch several times in a single line.<CR>
<CR>
<CR>
\cpi 10\<CR>
The ML182-I is capable of \cpi 5\ changing \cpi 10\ character pitch in a single line. SuperWriter 1.03 will automatically adjust the \cpi 5\bLEFTb and brightb\cpi 10\ margins so that the user does not have to reset them.<CR>
<CR>
<CR>
This is 10 cpi \cpi 17.1\ or 17.1 cpi. Don't forget that \cpi 8.5\ WIDE MODE \cpi 8.5\ is available. Well, \cpi 10\ back to 10 cpi pitch size.<CR>
<CR>
<CR>

This user tip will describe how to use the OKIDATA ML182-I and Sorcim's SuperWriter Ver. 1.03. This paragraph is being printed in 10 cpi.

This paragraph is being printed at 17.1 cpi. Note that the left and right margins do not have to be reset if the character pitch is changed. In fact, it is possible to change the character pitch several times in a single line.

The ML182-I is capable of changing character pitch in a single line. SuperWriter 1.03 will automatically adjust the LEFT and RIGHT margins so that the user does not have to reset them.

This is 10 cpi or 17.1 cpi. Don't forget that WIDE MODE is available. Well, back to 10 cpi pitch size.

APPENDIX C
Interface Cables

APPENDIX C INTERFACE CABLE

Cables and Connectors

This appendix is designed to help you make a cable to connect your printer to your computer. Please do not attempt to make a cable unless you have experience in doing so. In this section we explain the signals from the printer end; you should read your computer documentation to determine the requirements on the computer end.

Parallel Cable

The Microline 182/183 requires a Centronics-equivalent parallel cable with the following:

Amphenol 57-30360 or AMP 552274-1 plug (or equivalent) with 36 pins

AMP 552073-1 (or equivalent) cover

Beldon (or equivalent) shielded cable, maximum 5-1/2 yards with twisted-pair conductors. It must be UL and CSA (equivalent to European standards) approved.

The printer has a 36-pin receptacle, Amphenol 57-40360-12-D56, built into the back.

The wiring requirements are as follows:

Pin #	Signal	Return Pin #	Direction	Description
1	$\overline{\text{Data Strobe}}$	19	To printer	Strobe pulse to read data in. Pulse width must be more than 0.5 μs at receiving terminal. The signal level is normally high; read-in of data is performed at the low level of this signal.
2	Data 1	20	To printer	These signals represent information in the 1st to 8th bits of parallel data respectively. Each signal is at high level when data is logical 1 and low when logical 0.
3	Data 2	21	To printer	
4	Data 3	22	To printer	
5	Data 4	23	To printer	
6	Data 5	24	To printer	
7	Data 6	25	To printer	
8	Data 7	26	To printer	
9	Data 8	27	To printer	
10	$\overline{\text{ACKNOWLEDGE}}$	28	From printer	Approximately 3-μs low pulse. Low indicates that data has been received and that printer is now ready to accept other data.

Pin #	Signal	Return Pin #	Direction	Description
11	Busy	29	From printer	A high signal indicates that the printer cannot receive data. The signal becomes high in the following cases: 1. During data entry 2. During printing 3. In offline state 4. During printer error state
12	Paper End	30	From printer	A high signal indicates that the printer is out of paper.
13	Select	No return	From printer	This signal indicates that the printer is ready to receive data.
14	0 V	No return	—	Logic ground
15	Not used	—	—	—
16	0 V	No return	—	Logic ground
17	Frame Ground	No return	—	Printer's frame ground. In the printer, the frame ground and the logic ground are isolated from each other.

Pin #	Signal	Return Pin #	Direction	Description
18	+5 V	—	From printer	+5 V supply (50 mA max.)
19 to 30	0 V	—	—	Twisted-pair return (for pin No. 1 to No. 12).
31	$\overline{\text{I-Prime}}$	—	To printer	Clear/reset/initialize. Low pulse.
32	$\overline{\text{Fault}}$	—	From printer	The level of this signal is low when the printer: 1. Is in the paper end state 2. Is in the error state
33	0 V	No return	—	Logic ground
34 to 36	Not used	—	—	—

Serial Cable

The Microline 182/183 requires an RS232-C shielded cable, UL and CSA (equivalent to European standards) approved, no more than 50 feed in length, with the following:

Cannon DB-25P plug (or equivalent) with 25 pins

Cannon DB-2C-J9 (or equivalent) connector shell

High-Speed Serial Interface Signal Requirements:

NOTE TO USER: *This board only supports printer Ready/Busy protocol. If your computer uses X-ON/X-OFF protocol, you must install the super-speed serial board.*

Pin	Signal	Symbol	Direction	Description
1	Frame Ground	FG	—	Connected to the printer frame
2	Transmit Data	TD	From printer	Not used. Always set to low.
3	Receive Data	RD	To printer	Serial data received by the printer
4	Request to Send	RTS	From printer	Always set to low.
7	Signal Ground	SG	Ground	Ground
11	Supervisory Send Data	SSD	—	Indicates the printer is ready to receive data.
20	Data Terminal Ready	DTR	From printer	Indicates the printer is not ready to receive data.

In addition to the cable, this optional serial interface has a piggyback circuit board that must be installed in the printer. (Installation instructions are included with the serial board.) On the board is a set of eight function switches, which you may have to reset depending on the computer you connect to the printer.

Before installing the board, make sure the switches are set properly. The function of each switch is as follows:

Switch 1: Regulates the polarity of the busy signal. Originally set OFF, so the printer sends a negative (−) low signal when the printer is busy. Set this switch to OFF if your computer requires a positive (+) high signal from the printer when it is busy.

Switches 2 to 4: Select the transmission speed (baud rate) between the computer and printer. The factory setting is 1200 baud. Use the chart below to choose another speed:

Speed	Switch 2	Switch 3	Switch 4
9600	ON	ON	ON
4800	OFF	ON	ON
2400	ON	OFF	ON
1200	OFF	OFF	ON
600	ON	ON	OFF
300	OFF	ON	OFF
150	ON	OFF	OFF
110	OFF	OFF	OFF

Switch 6: Factory set in the ON position; this setting allows the printer to receive data with parity (the way most popular personal computers transmit data).

NOTE: *Switches not mentioned in the list above are not currently used and should be left in their factory settings.*

If you have the know-how and the necessary tools and equipment to make your own cable, here is what you will need:

1. A-25 conductor cable. We recommend a shielded cable consisting of 22 AWG standard wires not to exceed 10 feet in length.
2. One 25-pin plug: equivalent to Cannon DB25-P for the IBM side.
3. One 36-pin plug: equivalent to Amphenol 57-30360 for the printer side.
4. Wire the pins on the 25-pin plug to those on the 36-pin plug as shown below:

Computer (25 Pin)	Printer (36 Pin)	Signal
1	1	Strobe
2	2	Data 0
3	3	Data 1
4	4	Data 2
5	5	Data 3
6	6	Data 4
7	7	Data 5
8	8	Data 6
9	9	Data 7
10	10	Acknowledge
11	11	Busy
12	12	Paper End
13	13	Select
15	32	Error
16	31	I-Prime
19	19	Ground
20	21	Ground
21	23	Ground
22	25	Ground
23	27	Ground
24	29	Ground
25	30	Ground

Super-Speed Serial Interface Signal Requirements:

Pin	Signal	Symbol	Direction	Description
1	Frame Ground	FG	Ground	Connected to the printer frame.
2	Transmit Data	TD	From Ptr	Transmits serial data from the printer in X-ON/X-OFF protocol.
3	Receive Data	RD	To Ptr	Serial data received by the printer.
4	Request to Send	RTS	From Ptr	In Printer Ready/Busy protocol indicates printer not ready to receive data.
6	Data Set Ready	DSR	To Ptr	Tells the printer the computer is ready to send data. The printer receives data after confirming this signal as high (+).
7	Signal Ground	SG	Ground	Ground
11	Supervisory Send Data	SSD	From Ptr	Indicates the printer is ready to receive data in Printer Ready/Busy protocol.
20	Data Terminal Ready	DTR	From Ptr	Indicates the printer is not ready to receive data in Printer Ready/Busy protocol.

In addition to the cable, this serial interface has a piggyback circuit board that must be installed in the printer. On the board are 16 function switches (two sets of eight switches) that you may have to reset depending on the model computer you connect to the printer.

Before installing the board, make sure the switches are set properly. The function of each switch is as follows:

Switches 1, 2: Work together to regulate parity (odd, even, or no parity). Factory set to no parity; you can reset the switches as shown below.

Selection	Switch 1	Switch 2
Odd Parity	ON	OFF
Even Parity	OFF	OFF
No Parity	ON/OFF	ON

NOTE: *If you have a 7-bit system, you must select a parity setting, either odd or even, depending on your computer's requirement.*

Switch 3: Factory set ON to select 8-bit data. Set this switch to OFF if you have a 7-bit system.

Switch 4: Factory set ON for printer Ready/Busy protocol. Set this switch to OFF if your computer uses X-ON/X-OFF protocol.

Switches 5, 6: Work together to enable you to run two serial cable tests: one checks to ensure that you have the proper switch settings, and the other checks the data cable to see if it is communicating properly. The factory setting is the non-test mode, called the print mode; pages 126 and 127 provide details about the circuit and monitor tests.

Selection	Switch 1	Switch 2
Print Mode	ON/OFF	ON
Circuit Test	ON	OFF
Monitor Test	OFF	OFF

Switches 7, 8: If you selected printer Ready/Busy protocol (Switch 4 is ON), you can choose the line on which the printer sends a busy signal and the polarity of the signal (low or high). Factory set for a low (−) on pin #11, SSD. You can have the printer send a busy signal on the following lines:

Selection	Switch 7	Switch 8
DTR Pin #20 (−v)	ON	ON
RTS Pin #4 (−v)	ON	OFF
SSD Pin #11 (−v)	OFF	ON
SSD Pin #11 (+v)	OFF	OFF

Switches 9 to 11: Select the transmission speed (baud rate) from the chart below. The switches are factory set to select 9600 baud.

Selection	Switch 9	Switch 10	Switch 11
19200	ON	ON	ON
9600	OFF	ON	ON
4800	ON	OFF	ON
2400	OFF	OFF	ON
1200	ON	ON	OFF
600	OFF	ON	OFF
300	ON	OFF	OFF
110	OFF	OFF	OFF

Switch 12: If printer pin #6, DSR, is connected to the computer, leave this switch in the factory ON setting. If the computer does not use the DSR signal, set this switch to OFF to prevent static to transmission.

Switch 13: This switch is factory set to ON so that the printer waits until the print buffer has room for only 32 more bytes before sending a busy signal to the computer. If you discover that you are losing data, set this switch to OFF; the printer will send a busy signal when room for only 256 more characters remins in the print buffer.

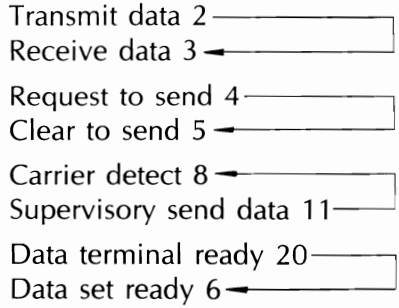
Switch 14: Factory set ON for a 200-ms busy time (the time it takes the printer to empty the print buffer and be ready to receive data), this switch can be set to OFF if your computer requires more time to process a response to a busy signal. This situation normally arises when the printer is not connected directly to the host computer.

NOTE: *Those switches not mentioned in the list above are not currently used and should be left in their factory settings.*

Super-Speed Serial Board Diagnostic Tests:

If you would like to check your serial cable to ensure it is sending and receiving the right signals, you can run either of the following tests. For the circuit test, however, you need to purchase (or make) a test cable as shown below then follow the directions under "Performing the Circuit Test."

1. Purchase or make a test cable, using a Cannon DB-25P plug, to jumper the following pins:



2. Be sure to have paper and ribbon inserted, then turn the printer off.

3. Remove the printer cabinet:
   a. Remove the platen knob.
   b. Remove the access cover, roll paper stand, and tractor feed unit if installed.
   c. Loosen the two recessed mounting screws on both sides of the top front on the printer.
   d. Lift off the cabinet.

Performing the Circuit Test:

A circuit test checks the serial interface to ensure that the proper signals are being sent on the active lines. The test provides a printout notice indicating whether the test was performed successfully. After you remove the printer cabinet, proceed as follows:

1. Set switch #6 to OFF, selecting the circuit test.

2. Disconnect your interface cable and connect the test cable.

3. Turn the printer on, leaving the cabinet off; the test should produce the following results:

   "LOOP TEST" is printed
   "RAM 2K" is printed

   The message buffer is checked. If memory is normal, "OK" is printed. If memory is faulty, "BAD" is printed.
   Signals DTR, RTS, and SSD are set to low (−). If CTS, DSR, or CD is positive, "IF BAD" is printed.

4. If you received a "BAD" message, something is wrong with your serial interface. If you are unable to diagnose the problem, contact your OKI dealer for further assistance. If your dealer cannot assist you, call our Customer Service Representatives at OKIDATA GmbH.

5. Reset switch #6 to the ON position.
6. Replace the printer cabinet or proceed to the following instructions on the monitor mode test.

Performing the Monitor Mode Test:

The monitor mode test is a unique feature of the Super-Speed board. With this test, you can verify that the data sent to the printer is set at the proper baud rate, parity, and data bits. To perform this test, proceed as follows:

1. Set switches 5 and 6 to OFF to select the monitor mode test.
2. Turn the printer and computer on, leaving the printer cabinet off.
3. Enter the characters "ABCDE" followed by a carriage return and a line feed.*

   * Use the programming statement your computer requires, such as LPRINT or PR#1. In BASIC, the statement looks like this:

   ```
   10 LPRINT "ABCDE"
   ```

4. The printer responds by printing the hexadecimal equivalent of each character you entered, each on a separate line. With the above statement, you should have gotten this:

   ```
   41
   42
   43
   44
   45
   0D
   0A
   ```

NOTE: *The hexadecimal numbers 41 through 45 are the characters "A" through "E." 0D and 0A hexadecimal symbols for a carriage return and line feed.*

5. If you got the above printout, congratulations, your cable is correctly configures for the ML182/183. At this point, you can replace the cabinet and close up the printer.

6. If you did not get the right printout, review what you got instead, to determine what went wrong.

   NOTHING PRINTED:

   a. Make sure you used the right print statement for your computer.
   b. Verify that your interface cable is connected properly.
   c. Make sure your cable is wired to satisfy all the requirements of both your compute and your printer. (Page 116 details the printer's requirements.)
   d. Make sure the printer is plugged in.

   "PARITY ERROR" PRINTED:

   A parity error occurs when the printer checks for an odd number of binary digits and an even number is received or vice versa. If you have switch 1 set to ON for odd parity, try the OFF setting. If you have it OFF, try the ON setting for even parity. Then turn the printer off and try the test again.

   If your problem still is not corrected, and your ML182/183 successfully performed the printer self-test, call your dealer or OKIDATA GmbH for assistance.

APPENDIX D
ASCII Character Code Chart

APPENDIX D ASCII Character Code Chart

This chart shows the ASCII character set and corresponding code numbers in decimal, hexadecimal and binary form.

Decimal	Binary	Hexadecimal	ASCII Character
0	00000000	00	(NUL)
1	00000001	01	(SOH)
2	00000010	02	(STX)
3	00000011	03	(ETX)
4	00000100	04	(EOT)
5	00000101	05	(ENQ)
6	00000110	06	(ACK)
7	00000111	07	(BEL)
8	00001000	08	(BS)
9	00001001	09	(HT)
10	00001010	0A	(LF)
11	00001011	0B	(VT)
12	00001100	0C	(FF)
13	00001101	0D	(CR)
14	00001110	0E	(SO)
15	00001111	0F	(Si)
16	00010000	10	(DEL)
17	00010001	11	(DC1)
18	00010010	12	(DC2)
19	00010011	13	(DC3)
20	00010100	14	(DC4)
21	00010101	15	(NAK)
22	00010110	16	(SYN)
23	00010111	17	(ETB)
24	00011000	18	(CAN)
25	00011001	19	(EM)
26	00011010	1A	(SUB)
27	00011011	1B	(ESC)
28	00011100	1C	(FS)
29	00011101	1D	(GS)
30	00011110	1E	(RS)

Decimal	Binary	Hexadecimal	ASCII Character
31	00011111	1F	(US)
32	00100000	20	(SP)
33	00100001	21	!
34	00100010	22	"
35	00100011	23	#
36	00100100	24	$
37	00100101	25	%
38	00100110	26	&
39	00100111	27	'
40	00101000	28	(
41	00101001	29	)
42	00101010	2A	*
43	00101011	2B	+
44	00101100	2C	,
45	00101101	2D	−
46	00101110	2E	.
47	00101111	2F	/
48	00110000	30	0
49	00110001	31	1
50	00110010	32	2
51	00110011	33	3
52	00110100	34	4
53	00110101	35	5
54	00110110	36	6
55	00110111	37	7
56	00111000	38	8
57	00111001	39	9
58	00111010	3A	:
59	00111011	3B	;
60	00111100	3C	<
61	00111101	3D	=
62	00111110	3E	>
63	00111111	3F	?
64	01000000	40	@
65	01000001	41	A

Decimal	Binary	Hexadecimal	ASCII Character
66	01000010	42	B
67	01000011	43	C
68	01000100	44	D
69	01000101	45	E
70	01000110	46	F
71	01000111	47	G
72	01001000	48	H
73	01001001	49	I
74	01001010	4A	J
75	01001011	4B	K
76	01001100	4C	L
77	01001101	4D	M
78	01001110	4E	N
79	01001111	4F	O
80	01010000	50	P
81	01010001	51	Q
82	01010010	52	R
83	01010011	53	S
84	01010100	54	T
85	01010101	55	U
86	01010110	56	V
87	01010111	57	W
88	01011000	58	X
89	01011001	59	Y
90	01011010	5A	Z
91	01011011	5B	[
92	01011100	5C	\
93	01011101	5D	]
94	01011110	5E	^
95	01011111	5F	_
96	01100000	60	`
97	01100001	61	a
98	01100010	62	b
99	01100011	63	c
100	01100100	64	d

Decimal	Binary	Hexadecimal	ASCII Character
101	01100101	65	e
102	01100110	66	f
103	01100111	67	g
104	01101000	68	h
105	01101001	69	i
106	01101010	6A	j
107	01101011	6B	k
108	01101100	6C	l
109	01101101	6D	m
110	01101110	6E	n
111	01101111	6F	o
112	01110000	70	p
113	01110001	71	q
114	01110010	72	r
115	01110011	73	s
116	01110100	74	t
117	01110101	75	u
118	01110110	76	v
119	01110111	77	w
120	01111000	78	x
121	01111001	79	y
122	01111010	7A	z
123	01111011	7B	{
124	01111100	7C	|
125	01111101	7D	}
126	01111110	7E	~
127	01111111	7F	(DEL)
128	10000000	80	
129	10000001	81	
130	10000010	82	
131	10000011	83	
132	10000100	84	
133	10000101	85	
134	10000110	86	
135	10000111	87	N/A

Decimal	Binary	Hexadecimal	ASCII Character
136	10001000	88	N/A
137	10001001	89	
138	10001010	8A	
139	10001011	8B	
140	10001100	8C	
141	10001101	8D	
142	10001110	8E	
143	10001111	8F	
144	10010000	90	
145	10010001	91	
146	10010010	92	
147	10010011	93	
148	10010100	94	
149	10010101	95	
150	10010110	96	
151	10010111	97	
152	10011000	98	
153	10011001	99	
154	10011010	9A	
155	10011011	9B	
156	10011100	9C	
157	10011101	9D	
158	10011110	9E	
159	10011111	9F	
160	10100000	A0	
161	10100001	A1	
162	10100010	A2	
163	10100011	A3	
164	10100100	A4	
165	10100101	A5	
166	10100110	A6	
167	10100111	A7	
168	10101000	A8	
169	10101001	A9	
170	10101010	AA	

Decimal	Binary	Hexadecimal	ASCII Character
171	10101011	AB	N/A
172	10101100	AC	
173	10101101	AD	
174	10101110	AE	
175	10101111	AF	
176	10110000	B0	
177	10110001	B1	
178	10110010	B2	
179	10110011	B3	
180	10110100	B4	
181	10110101	B5	
182	10110110	B6	
183	10110111	B7	
184	10111000	B8	
185	10111001	B9	
186	10111010	BA	
187	10111011	BB	
188	10111100	BC	
189	10111101	BD	
190	10111110	BE	
191	10111111	BF	
192	11000000	C0	
193	11000001	C1	
194	11000010	C2	
195	11000011	C3	
196	11000100	C4	
197	11000101	C5	
198	11000110	C6	
199	11000111	C7	
200	11001000	C8	
201	11001001	C9	
202	11001010	CA	
203	11001011	CB	
204	11001100	CC	
205	11001101	CD	

Decimal	Binary	Hexadecimal	ASCII Character
206	11001110	CE	N/A
207	11001111	CF	
208	11010000	D0	
209	11010001	D1	
210	11010010	D2	
211	11010011	D3	
212	11010100	D4	
213	11010101	D5	
214	11010110	D6	
215	11010111	D7	
216	11011000	D8	
217	11011001	D9	
218	11011010	DA	
219	11011011	DB	
220	11011100	DC	
221	11011101	DD	
222	11011110	DE	
223	11011111	DF	
224	11100000	E0	
225	11100001	E1	
226	11100010	E2	
227	11100011	E3	
228	11100100	E4	
229	11100101	E5	
230	11100110	E6	
231	11100111	E7	
232	11101000	E8	
233	11101001	E9	
234	11101010	EA	
235	11101011	EB	
236	11101100	EC	
237	11101101	ED	
238	11101110	EE	
239	11101111	EF	
240	11110000	F0	

Decimal	Binary	Hexadecimal	ASCII Character
241	11110001	F1	N/A
242	11110010	F2	
243	11110011	F3	
244	11110100	F4	
245	11110101	F5	
246	11110110	F6	
247	11110111	F7	
248	11111000	F8	
249	11111001	F9	
250	11111010	FA	
251	11111011	FB	
252	11111100	FC	
253	11111101	FD	
254	11111110	FE	
255	11111111	FF	

APPENDIX E
Specifications

APPENDIX E IBM-COMPATIBLE ML182/183 SPECIFICATIONS

I. PERFORMANCE

Print Speed
- Utility mode (UM) ..... 120 cps
- Near letter Quality (NLQ) mode ..... 20 cps

Print Technique ..... Bidirectional/short line seeking
Optional: unidirectional

II. PRINTING

DOT Matrix, standard characters ..... 17 x 17 (NLQ)
9 x 9 (LM)

Characters per line ..... 80 standard size (ML182)
132 condensed size (ML182)
136 standard size (ML183)
233 condensed size (ML183)

III. MEDIA

Number of sheets ..... 1 to 3

Maximum width of paper	ML182	ML183
Roll paper	216 mm	NA
Pin feed	254 mm	406 mm
Tractor feed	241 mm	406 mm

Paper Path ..... bottom or rear

Ribbon
- Cartridge with 3 million character life
- 1.0 to 1.6m seamless ribbon with reinking

IV. INTERFACES

Parallel ..... Centronics-compatible

Serial
- RS232-C High Speed ..... Up to 9,600 baud
- RS232-C Super Speed ..... Up to 19,200 baud
- RS422-A High Speed ..... Up to 9,600 baud
- RS422-A Super Speed ..... Up to 19,200 baud
- Current loop ..... Up to 9,600 baud

V. RELIABILITY

Mean Time Between Failures (MTBF) ..... 4,000 hours
Mean Time Repair (MTTR) ..... 15 minues
Print head life ..... 200 million characters

VI. ELECTRICAL CHARACTERISTICS

Voltage ..... 220 VAC ± 10%
240 VAC ± 10%
Frequency ..... 50/60 Hz ± 2%

VII. PHYSICAL CHARACTERISTICS

IBM-COMPATIBLE ML182

Width ..... 372 mm
Depth ..... 275 mm
Height ..... 80 mm
Weight ..... 4.5 kg

IBM-COMPATIBLE ML183

Width ..... 524 mm
Depth ..... 278.5 mm
Height ..... 128 mm
Weight ..... 6 kg

APPENDIX F
Character Code Table

APPENDIX F CHARACTER CODE TABLES

Character set I (selected by ESC 7)

				b8 = 0								b8 = 1							
			b7	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
			b6	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
			b5	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	0	0	0	NUL		SP	0	@	P		p	NUL		á				α	≡
0	0	0	1	1			!	1	A	Q	a	q			í				ß	±
0	0	1	0	2		DC2	"	2	B	R	b	r		DC2	ó				Γ	≥
0	0	1	1	3			#	3	C	S	c	s			ú				π	≤
0	1	0	0	4		DC4	$	4	D	T	d	t		DC4	ñ				Σ	⌠
0	1	0	1	5			%	5	E	U	e	u			Ñ				σ	⌡
0	1	1	0	6			&	6	F	V	f	v			ª				μ	÷
0	1	1	1	7	BEL		'	7	G	W	g	w	BEL		º				τ	≈
1	0	0	0	8		CAN	(	8	H	X	h	x		CAN	¿				Φ	°
1	0	0	1	9	HT		)	9	I	Y	i	y	HT		⌐				Θ	∙
1	0	1	0	A	LF		*	:	J	Z	j	z	LF		¬				Ω	·
1	0	1	1	B	VT	ESC	+	;	K	[	k	{		ESC	1/2				δ	√
1	1	0	0	C	FF		,	<	L	\	l	|	FF		1/4				∞	n
1	1	0	1	D	CR		−	=	M	]	m	}	CR		¡				ø	2
1	1	1	0	E	SO		.	>	N	^	n	~	SO		«				∈	■
1	1	1	1	F	SI		/	?	O	_	o		SI		»				∩	SP

Character set II (selected by ESC 6)

				b8 = 0								b8 = 1							
			b7	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
			b6	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
			b5	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	0	0	0	NUL		SP	0	@	P		p	Ç	É	á				α	≡
0	0	0	1	1			!	1	A	Q	a	q	ü	æ	i				β	±
0	0	1	0	2		DC2	//	2	B	R	b	r	é	Æ	ó				Γ	≥
0	0	1	1	3	♥		#	3	C	S	c	s	â	ô	ú				π	≤
0	1	0	0	4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ				Σ	⌠
0	1	0	1	5	♣	§	%	5	E	U	e	u	à	ò	Ñ				σ	⌡
0	1	1	0	6	♠		&	6	F	V	f	v	å	û	ª				μ	÷
0	1	1	1	7	BEL		´	7	G	W	g	w	ç	ù	º				τ	≈
1	0	0	0	8		CAN	(	8	H	X	h	x	ê	ÿ	¿				Φ	°
1	0	0	1	9	HT		)	9	I	Y	i	y	ë	Ö	⌐				Θ	∙
1	0	1	0	A	LF		*	:	J	Z	j	z	è	Ü	¬				Ω	·
1	0	1	1	B	VT	ESC	+	;	K	[	k	{	ï	¢	1/2				δ	√
1	1	0	0	C	FF		,	<	L	\	l	|	î	£	1/4				∞	n
1	1	0	1	D	CR		−	=	M	]	m	}	ì	¥	¡				∅	2
1	1	1	0	E	SO		.	>	N	^	n	~	Ä	Pt	«				∈	■
1	1	1	1	F	SI		/	?	O	_	o		Å	f	»				∩	SP

GLOSSARY

GLOSSARY

ASCII — American Standard Code for Information Interchange: a standard code which uses numbers to represent characters (letters, numerals, and symbols) and control instructions. (See Appendix B.)

BASIC — Beginner's All-purpose Symbolic Instruction Code: one of the most popular programming languages used with personal computers. Programming examples in this User's Manual are written in BASIC.

Baud — A measure of the speed at which data is transmitted. In personal computers, the baud rate is equivalent to bits per second. With serial interfaces, the printer must be set to receive data at the same baud rate at which the computer transmits data.

Bit — Binary digit. Each bit is either 1 or 0.

Byte — A basic unit of information consisting of eight bits. One byte can represent any ASCII character or any number between 0 and 255. (Note: Some computers handle data in 7-bit units.)

CPI — Characters Per Inch: a measure of character width. Note that 10-cpi characters are wider than 17.1-CPI characters.

Firmware — Programming or information recorded in a permanent storage device, such as a ROM or PROM. Firmware is fixed and cannot be modified as software can.

Hardware — The tangible machinery and circuits in a computer system: keyboard, printed-circuit boards, print head, etc.

Interface The connection between two pieces of equipment, such as between a computer and a printer. The two basic types of interface are parallel and serial. The word is loosely used to mean either the method of connection or the actual hardware used to connect equipment, including the circuits that control communication. As a verb, it usually means the act of making the connection.

LPI Lines Per Inch: a measure of line spacing. When the line spacing is 6 LPI, the distance between the bottom of one line of print and the bottom of the next is 1/6 inch.

Parallel Interface An interface in which the eight bits comprised by a byte of data are transmitted simultaneously over eight separate wires.

Parity A method of checking for data transmission errors used in some serial interfaces. The computer adds a bit (the "parity bit") to each byte of data so the total number of 1s is either always even ("even parity") or always odd ("odd parity"). The printer checks each incoming byte plus parity bit to make sure the parity is correct. If the parity is not correct, the data has not been sent (or received) properly. The printer will signal when it detects a "parity error."

PROM Programmable Read-Only Memory: ROM that can be programmed, but only with special equipment, so for most people PROM and ROM are the same. Some MICROLINE options consist of a set of PROMs to replace those in the standard printer. The new PROMs tell the printer to interpret control codes differently.

Protocol A set of rules controlling serial communication between the computer and the printer. Using signals defined by a protocol, the printer can acknowledge that it has received data or tell the computer to stop sending data until more storage space in the printer is available. Protocols also set the format for data transmission.

RAM Random Access Memory: a temporary memory device (integrated-circuit chip). In MICROLINE printers, RAM is used for temporary storage of data before printing (this type of RAM is called a buffer) and for storage of commands to change printing features, VFU formats, and DLCG characters.

NOTE: *This type of memory is volatile; that is, it is erased when the printer is turned off.*

ROM Read-Only Memory: a permanent storage device (integrated-circuit chip). Information stored in ROM or firmware, can be read but cannot be added to or changed. In MICROLINE printers, ROM is used to store the dot patterns for the character sets, instructions for interpreting control codes, etc.

RS232-C A uniform standard for serial interfaces set by the Electronic Industries Association (EIA). It establishes standards for signals and cabling. Most personal computers follow this standard for serial interfaces with some variations.

Serial Interface An interface in which the eight bits in each byte of data are transmitted one after the other over one wire.

Software A program or set of instructions that tells your computer or printer what to do. It is called soft because, like words, it does not really have a physical form the way something like a rock does. A software package is a commercially prepared program or set of programs, usually sold on a disk or cassette tape.

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